PAGE'S WEEKLY — Miscellaneous

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Miscellaneous

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Miscellaneous

THOMAS GREENWOOD

Waterside, HALIFAX,

has ready for immediate delivery

200

ENGINEERS' and BOILER MAKERS' MACHINE TOOLS.

Tell me your wants or send for Catalogue.

ROOFING

McTEAR & COMPANY, LTD

ROOF CONTRACTORS, FELT MANUFACTURERS, Etc

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THE MAXIMUM OF AREA COVERED AT THE MINIMUM OF COST.

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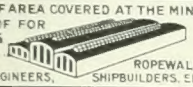

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FOR TANNERS. IRON FOUNDERS. ENGINEERS.

ROPEWALKS. COLLERIES. SHIPBUILDERS. ELECTRICIANS.

SITES INSPECTED & ESTIMATES FREE

Refuse Destructors.

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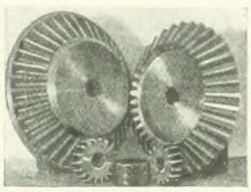
Works: MANCHESTER and WORCESTER.



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A SPECIALITY.

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AD. AHLERS,

Whitley Bay, Newcastle-on-Tyne.

"TURPOLENE"

A perfect substitute for American Spirits of Turpentine for Painters, Printers, Varnish Makers, and for all other purposes where Turpentine is used.

Same odour, same flash point, same result in the working as in genuine Turps. We are the original and only makers of genuine Turpolene.

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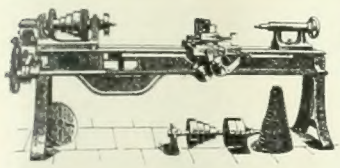
19 & 20, Water Lane, Great Tower Street, London, E.C.

Branches at Glasgow, Bristol, Hull, Newcastle-on-Tyne, &c.

Blast Furnace Work.

THOMAS PIGGOTT & CO., LTD., SPRING HILL, BIRMINGHAM. **Send for Estimates.**



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In stock for immediate delivery.

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Albion Works,

SHEFFIELD.

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MACHINE TOOLS.

See Next Week.

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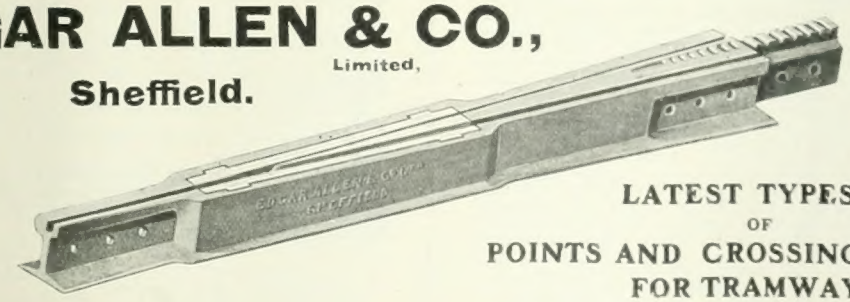
Limited,

Sheffield.



LATEST TYPES.

OF

POINTS AND CROSSINGS

FOR TRAMWAY WORK.

PAGE'S WEEKLY

Contracts

CONTRACTS.

PONTYPRIDD URBAN DISTRICT COUNCIL.
ELECTRIC LIGHT AND TRAMWAYS DEPARTMENT.

The above Council invite TENDERS for the SUPPLY, DELIVERY, and ERECTION of ONE 300-kilowatt STEAM DYNAMO.

Copies of the General Conditions, Specification, and Form of Tender, prepared by Mr. J. E. Teasdel, A.M.I.E.E., Engineer and Manager, may be obtained on and after January 24th, 1906, upon receipt by the undersigned of a deposit of £2 2s., which will, after the Council shall have entered into a contract upon the Tenders received, be returned to the Tenderer, provided that he shall have sent in a *bona fide* Tender, and shall not have withdrawn the same.

Tenders, on the prescribed form, sealed, and endorsed "Tender for Steam Dynamo," must be received by the undersigned on or before FEBRUARY 13th, 1906.

The Council do not bind themselves to accept the lowest or any Tender.

J. COLENSO JONES,
Clerk to the Council.

District Council Offices, Pontypridd, January 15th, 1906.

MINERAL OIL CONTRACT.

The Commissioners of Irish Lights hereby give notice that they are prepared to receive TENDERS for the SUPPLY and DELIVERY at certain Ports round Ireland of 28,000 Imperial gallons, more or less, of the FINEST QUALITY HEAVY MINERAL OIL, in such quantities as may be required from time to time during the twelve months ending March 31st, 1907.

Forms of Tender and Specification can be obtained on application to the undersigned.

Tenders, sealed, addressed to "The Secretary, Irish Lights Office, Dublin," and endorsed "Tender for Heavy Mineral Oil," should be posted so as to reach this office not later than noon on Thursday, February 22nd, 1906.

The Commissioners will only give consideration to such Tenders as are submitted on their forms, and will not bind themselves to accept the lowest or any Tender.

Firms desirous of tendering are requested to note that a sample of Five Gallons of the Oil proposed to be supplied must be forwarded so as to reach this office not later than one clear week in advance of the date named herein for the receipt of the Tenders.

The vessel containing the Sample is to bear an easily recognised distinguishing mark, which mark is to be repeated in the Tender for the purpose of identification, but under no circumstances is the name, trade, or private mark of the firm to appear on the vessel.

By order,
HUBERT G. COOK,
Secretary.

Irish Lights Office, Dublin,
January 24th, 1906.

COUNTY BOROUGH OF WEST HAM.
TO ELECTRICAL ENGINEERS AND OTHERS.

The Council hereby invite TENDERS for:

1. ONE 1,500-2,000-kw. TWO-PHASE TURBO-GENERATOR.
2. ONE 500-kw. MOTOR-GENERATOR, 500-550 volts direct current to 2,100 volts alternating current, two-phase. And
3. SWITCHGEAR for above.

Specification, Form of Tender, and further particulars may be obtained from the Borough Electrical Engineer, A. HUGH SEABROOK, Tucker Street, Canning Town, West Ham, on and after Friday, February 2nd, on the deposit of a £5 Bank of England note, which will be returned on receipt of a *bona fide* Tender.

Tenders, endorsed "Tender for Turbine-Generator, &c.," to be sent to my office not later than 4 o'clock on Friday, February 16th, 1906.

The Council does not bind itself to accept the lowest or any Tender.

The Contractor will be required to enter into a bond, with two sureties, for the due performance of the Contract, and no Work will be ordered under the Contract until such bond has been duly executed.

The Contractor whose Tender is accepted and with whom a contract is entered into will be required to pay all workmen employed by him in or about the Contract such rates of pay and observe such hours of labour as are embodied in the schedule, which will be part of the Contract. In the event of any breach of such Agreement the Council will enforce the penalty clause in its entirety.

A Tender will not be accepted unless it is stated by the Contractor in the Tender, and proved to the satisfaction of the Council, that the Contractor at the date of the Tender pays to the whole of his workmen such rates of wages and observes such hours of labour as are recognised by the workmen's trade unions in the several localities where his work is done. If, after the Contract is signed, it shall be proved that the said statements of the Contractor in the Tender are contrary to fact, the Council shall be entitled to rescind the contract, or at its option to recover from the Contractor as liquidated damages, and not as a penalty, the sum of £50.

By order of the Council,
FRED. E. HILLEARY,
Town Clerk.

Town Hall, West Ham,
January, 1906.

RIVER WEAVER NAVIGATION.
TENDER FOR STORES.

The WEAVER TRUSTEES are prepared to receive TENDERS for the SUPPLY of all or any of the FOLLOWING MATERIALS for the Maintenance of the River from April 1st, 1906, to March 31st, 1907:

1. Leather Belting, Indiarubber, and Canvas Goods.
2. Building Materials (except timber).
3. Oils and Grease, both for illuminating and lubricating purposes: Candles, Paints, Varnishes, and Accessories, including Black Varnish.
4. Ironmongery, including Waste, Spades, Steam-Piping, Nails, Brushes, and General Stores.
5. Iron and Steel Bars, Angles, and Plates (except special boiler plates).
6. Cast Steel, Files, &c.
7. Bolts and Nuts, Bolt-Ends, Washers, Rivets, and Stud Iron.
8. Ropes, Twines, Cork Fenders, Hemp Packing, and Oakum.
9. Steam Coal, House Coal, and Gas Coke.

Schedules of approximate Quantities and Specifications may be obtained (on payment of One Guinea, which will be returned on receipt of a *bona fide* Tender) at the Engineer's Office, Northwich, and after Monday, January 22nd, and all Tenders and Samples must be sent in, addressed to the "Chairman of the Stores Committee, care of the Clerk, Weaver Navigation Office, Northwich," before 9 a.m., on MONDAY, February 12th, 1906.

The Trustees do not bind themselves to accept the lowest or any Tender, and may, if they think fit, where the Tender includes a number of different Articles, accept only portions of such Tender.

Application for Tender Forms to be addressed
J. A. SANER, M.Inst.C.E.,
Engineer.

Weaver Navigation Northwich.

EPSOM URBAN DISTRICT COUNCIL.
WATERWORKS PUMPING PLANT.

TENDERS are invited for SUPPLYING and ERECTING a GAS ENGINE and SUCTION GAS PLANT and a DEEP WELL PUMP capable of raising 50,000 gallons of water per hour against a head of 300 feet.

The work to be carried out to the specification, and to the satisfaction of Mr. W. VAUX GRAHAM, M.Inst.C.E., 5, Queen Anne's-gate, Westminster, from whom full particulars may be obtained on payment of £5 5s., which will be returned on receipt of a *bona fide* Tender.

Tenders must be sent in to Mr. E. G. WILSON, Clerk to the Epsom Urban District Council, Church Street, Epsom, marked "Tender for Pumping Plant," not later than first post on Monday, February 12th, 1906.

The Council do not bind themselves to accept the lowest or any Tender.

COUNTY OF LONDON.—
TO ENGINEERS AND OTHERS.

The London County Council invites TENDERS for the MANUFACTURE, SUPPLY, and ERECTION of THREE GAS ENGINES, each having three inverted single-acting cylinders over three cranks, and each capable of developing 350 brake horse-power at a speed of 100 revolutions per minute.

Persons desiring to submit Tenders may obtain the Drawing, Specification, Form of Tender, and other particulars upon application to the Chief Engineer, Mr. MAURICE FITZMAURICE, C.M.G., at the County Hall, Spring Gardens, S.W., upon payment to the Cashier of the Council of the sum of £2.

This amount will, after the Council or its Committee have come to a decision upon the Tenders received, but not before, be returned to the tenderer, provided he shall have sent in a *bona fide* Tender, and not have withdrawn the same.

Tenders must be upon the official Forms, and the printed instructions contained therein must be strictly complied with.

The Contractors will be bound by the Contract to pay to all workmen (except a reasonable number of legally bound apprentices) employed by them wages at rates not less, and to observe hours of labour not greater, than the rates and hours set out in the Council's list, and such rates of wages and hours of labour will be inserted in, and form part of the Contract by way of schedule.

Each Tender is to be delivered at the County Hall in a sealed cover addressed to "The Clerk of the London County Council, Spring Gardens, S.W.," and marked "Tender for Gas Engines, Shad Thames Pumping Station."

No Tender will be received after 10 a.m. on Tuesday, February 20th, 1906.

Any Tender which does not comply with the printed instructions for Tender may be rejected.

The Council does not bind itself to accept the lowest or any Tender, and it will not accept the Tender of any person or firm who shall on any previous occasion have withdrawn a Tender after the same had been opened, unless the reasons for the withdrawal were satisfactory to the Council.

G. L. GOMME,
Clerk of the London County Council.

County Hall, Spring Gardens, S.W.
January 16th, 1906.

PAGE'S WEEKLY — Contracts and Appointments Open

CITY OF CARDIFF.—The CARDIFF CORPORATION invite TENDERS for the SUPPLY of COOLING TOWERS, ELECTRICALLY-DRIVEN PUMPS, PIPE-WORK, &c., for their Roath Power Station.

General Conditions, Specifications, and Forms of Tender may be obtained from Mr. Arthur Ellis, City Electrical Engineer and Manager, Central Offices, The Hayes, Cardiff.

Sealed Tenders, endorsed "Cooling Towers," to be delivered at my office on or before Friday, February 16th.

J. L. WHEATLEY,
Town Clerk.

Town Hall, Cardiff, 17th January, 1906.

BRADFORD POOR LAW UNION.—The Guardians of the Bradford Poor Law Union are prepared to receive TENDERS from Masons and Bricklayers for the erection of PUMP-ROOM and STEAM-BOILER CHIMNEY, also TENDERS from Heating Engineers for the INSTALLATION of a SYSTEM of ATMOSPHERIC STEAM HEATING and MACHINERY in connection therewith, at the Union Hospital, Horton Lane, Bradford.

Contractors desirous of tendering for these Works are requested to forward their applications, along with a deposit of £2 2s. for each separate Contract (which will be returned on receipt of *bona fide* Tender), to Mr. Fred Holland, Engineer and Architect to the Board, 11, Parkinson's Chambers, Hustlergate, Bradford (Tel. No. 1,529), when particulars will be forwarded in due course. Drawings and Specifications may be seen at the Architect's Offices.

Sealed Tenders, on separate Forms of Tender supplied, to be endorsed "Pump-Room," "Chimney," "Atmospheric Heating," to be delivered to the undersigned not later than 9 a.m. on Monday, the 26th day February, 1906.

The lowest of any Tender will not necessarily be accepted, and the Tender of any person or firm who does not observe the fair contracts clauses referred to in specification will not be accepted.

By order,
GEORGE M. CROWTHER,
Clerk to the Guardians.

Union Offices, 22, Manor-row, Bradford,
January 18th, 1906.

BOROUGH OF DOVER.—ELECTRICITY DEPARTMENT—ENGINES.

The Corporation invite TENDERS for the SUPPLY and ERECTION of One 350-kilowat COMBINED STEAM GENERATOR SET for Traction purposes. The Engine to be of the High-Speed Vertical Compound Enclosed Type with Forced Lubrication. The time of delivery will be an essential feature of the Contract.

Copies of the Specification and Forms of Tender may be obtained from Mr. L. W. WOODMAN, Borough Electrical Engineer, Park Street, Dover, upon a deposit of One Guinea, which will be returned in respect of each *bona fide* Tender that is not accepted. Additional copies of Specification, 2s. 6d. each.

Sealed Tenders, on the prescribed form, to be addressed and delivered to me, and endorsed "Tender for Steam Generator," on or before February 12th, 1906.

The Contractor to enter into a contract and bond, with two approved sureties, for due completion.

The Corporation do not bind themselves to accept the lowest or any Tender.

WOLLASTON KNOCKER,
Town Clerk.

Castle Hill House, Dover,
January 23rd, 1906.

COUNTY BOROUGH OF SUNDERLAND.
ELECTRICITY DEPARTMENT.
TO MANUFACTURERS OF FEED PUMPS, COOLING TOWERS, AND SURFACE CONDENSERS.

The Corporation of Sunderland are prepared to receive TENDERS for the SUPPLY of—

(a) ONE BOILER FEED PUMP.
(b) ONE WOODEN COOLING TOWER.
(c) ONE SURFACE CONDENSER with Motor-Driven Pumps.
(d) COAL BUNKERS, GANTRY, and other Steelwork.

The Specifications and Forms of Tender can be obtained on application to the Borough Electrical Engineer, Mr. J. F. C. Snell, M.Inst.C.E., at his office, Town Hall, Sunderland, and on payment on £1 1s. (One Guinea) for each Specification, which will be returned on receipt of a *bona fide* Tender.

Sealed Tenders, addressed to the "Chairman of the Electricity and Lighting Committee," Town Hall, Sunderland, must be delivered at my office not later than 12 o'clock noon on Friday, the second day of March, 1906. Tenders to be endorsed "A, B, C, or D," according to item tendered for.

The Corporation do not bind themselves to accept the lowest or any Tender

FRAS. M. BOWEY,
Town Clerk.

Town Hall, Sunderland, January, 22nd, 1906.

THE URBAN DISTRICT COUNCIL OF BARNES.
STEAM DYNAMO AND SWITCHBOARD PANELS.

The Urban District Council of Barnes are prepared to receive Tenders for the Supply, Delivery and Erection of a 300-kilowatt STEAM DYNAMO, together with SWITCHBOARD PANELS and CONNECTIONS.

Specification, General Conditions and Form of Tender can be obtained from the undersigned on payment of a deposit of £1 1s., which will be returned on receipt of a *bona fide* Tender.

Tenders to be sealed and endorsed "Steam Dynamo," and delivered to the Clerk, Council House, High-street, Mortlake, S.W., not later than FEBRUARY 12th, 1906.

The Council do not bind themselves to accept the lowest or any Tender.

C. S. DAVIDSON, Electrical Engineer.

Electricity Works, High-street, Mortlake, S.W.

APPOINTMENTS OPEN.

INDIAN PUBLIC WORKS DEPARTMENT.

The Secretary of State for India in Council will, in the Summer of 1906, make not less than TEN APPOINTMENTS of ASSISTANT ENGINEER in the Permanent Establishment of the Indian Public Works Department, in addition to the appointments to be made from Cooper's Hill College.

The age of Candidates must not be less than 21, or more than 24 years on the 1st July, 1906.

A printed Form of Application, together with information regarding the conditions of the appointments and certain requirements laid down as to education and experience in engineering, may be obtained from the Secretary, Public Department, India Office, Whitehall, London, S.W.

The Form of Application is to be returned so as to reach him not later than Tuesday, 1st May next.

A. GODLEY,
Under Secretary of State.

India Office, December 19th, 1905.

CITY OF BRADFORD TECHNICAL COLLEGE.
DEPARTMENT OF ENGINEERING.

The LECTURESHIP in ELECTRICAL ENGINEERING is VACANT. Salary, £200 per annum.

Full particulars of the duties of the appointment and Form of Application may be obtained from Prof. G. F. Charnock at the College.

Applications to be sent in not later than 17th inst.

THO. GARBUTT,
Secretary, Bradford Education Committee.

STAFFORD RURAL DISTRICT COUNCIL.
CLERK OF WORKS.

The Rural District Council of Stafford require the services of a CLERK OF THE WORKS, to act under the instructions of their Engineers, Messrs. R. E. W. BERRINGTON AND SON, during the construction of Sewerage Works for the Parishes of Tillington and Castle Church.

Candidates must have had previous experience in similar work, and be capable of taking and giving levels, measuring up work, etc.

Salary, £3 per week; duration of contract about nine months.

Applications, in candidate's own handwriting, stating age and experience, and enclosing copies of not more than two recent testimonials, are to be sent to me, the undersigned, endorsed "Clerk of Works," on or before March 1st, 1906.

Canvassing will be a disqualification.

WILLIAM MORGAN,
Clerk to the Council.

Council Offices, 4, Martin Street, Stafford,
January 30th, 1906.

UNIVERSITY COLLEGE, NOTTINGHAM.

TWO JUNIOR DEMONSTRATORS and LECTURERS are REQUIRED to begin work on May 1st, 1906, one for PHYSICS, the other for ENGINEERING.

Applications by February 10th on forms which can be obtained from the Registrar.

Salary, £130, rising by £10 a year to £180.

Buyers' Directory.

NOTE.—*The display advertisements of the firms mentioned under each heading can be found readily by reference to the Alphabetical Index to Advertisers on pages 22 and 24.*

In order to assure fair treatment to advertisers, each firm is indexed under its leading speciality ONLY.

Advertisers who prefer, however, to be entered under two or more different sections can do so by an annual payment of 5s. for each additional section.

Advertisers' Service Bureau.
British Advertiser Service Bureau, Queen Anne's Chambers, Westminster, S.W.

Artesian Well Machinery.
John Z. Thom, Patricroft, Manchester.

Band Sawing Machines.
Noble & Lund, Ltd., Felling-on-Tyne.

Bearings (Roller).
Hyatt Roller Bearing Co., 47, Victoria Street, London S.W.

Belting.
Binney & Son, Catherine Street, City Road, London, E.C.
Cort, Arthur, & Co., Camberwell, London, S.E.
Fleming, Birkby & Goodall, Ltd., West Grove, Halifax.
Gilmour, W. & O., St. John's Hill, Edinburgh.

Boilers.
Clayton, Son & Co., Ltd., Leeds City Boiler Works, Leeds.
Hartley & Sugden, Ltd., Halifax.
Thompson, John, Wolverhampton.

Boilers (Water-tube).
Babcock & Wilcox, Ltd., Oriel House, Farringdon Street London, E.C.
Stirling Boiler Co., Ltd., Motherwell, N.B.

Bolts, Nuts, Rivets, etc.
Herbert W. Periam, Ltd., Floodgate Street Works, Birmingham.
T. D. Robinson & Co., Ltd., Derby.

Books.
Griffin, Charles, & Co., Exeter Street, Strand, W.C.
New Zealand Mines Record, Wellington, New Zealand.
Spon, E. & F. N., 125, Strand, W.C.

Boring Machines.
Asquith, William, Ltd., Well Road Works, Halifax.
Niles-Bement-Pond Co., 23-25, Victoria Street, London, S.W.
Noble & Lund, Ltd., Felling-on-Tyne.

Cables.
Callender's Cable and Construction Co., Ltd.

Case-Hardening Compounds.
Hy. Miller & Co., Millgarth Works, Leeds.

Castings.
Ashmore, Benson, Pease & Co., Ltd., Stockton-on-Tees.

Catalogues, Printing, &c.
Atlantic Press, Ltd., Weymouth Street, Manchester.
Spottiswoode Advertising Agency, Clun House, Surrey Street Strand, W.C.
Stafford, Arthur, & Co., Denton, Manchester.

Chucks.
Fairbanks Co., 78-80, City Road, London, E.C.

Cisterns, Tanks, &c.
Ashmore, Benson, Pease & Co., Ltd., Stockton-on-Tees.
Clayton, Son & Co., Ltd., Hunslet, Leeds.
F. A. Keep, Juxon & Co., Barn Street, Birmingham.

Clutches (Friction).
David Bridge & Co., Castleton Ironworks, Rochdale, Lancashire.

Condensing Plant.
Benn, Sykes, Haslingden, near Manchester.
Concentric Condenser, Ltd., 23, Northumberland Avenue, London, W.C.
Mirrlees-Watson & Co., Ltd., Glasgow

Consulting Engineers.
Gibbs, John, & Son, 80, Juke Street, Liverpool.
G. H. Hughes, A.M.I.M.E., 19, Old Queen Street, Westminster, S.W.
Melville & Macalpine, 615, Walnut Street, Philadelphia, Pa., U.S.A.
Mount-Haes, A., M.I.Mech.E., M.I.M.E., 11, Ironmonger Lane, London, E.C.

Continental Railway Arrangements.
Northern Railway of France.
South Eastern & Chatham Railway Co.

Conveying and Elevating Machinery.
Adolf Bleichert & Co., Leipzig-Gohlis, Germany.
Fraser & Chalmers, Ltd., 3, London Wall Buildings, London, E.C.
Temperley Transporter Co., 72, Bishopsgate Street Within, London, E.C.

Copper and Brass.
W. Hepton & Son, Hunslet Lane, Leeds

Coverings (Boiler).
Magnesia Covering Ltd., Washington Station, co. Durham.

Cranes, Travellers, Winches, etc.
Joseph Booth & Bros. Ltd, Rodley, Leeds.
Niles-Bement-Pond Co., 23-25, Victoria Street, London, S.W.

Cranks.
Clarke's Crank & Forge Co., Ltd., Lincoln, England.

Cutters (Milling).
Pratt & Whitney Co., 23-25, Victoria Street, London, S.W.
E. G. Wrigley & Co., Ltd., Foundry Lane Works, Soho, Birmingham

Destructors.
Heenan & Froude, 4, Chapel Walks, Manchester.
Horsfall Destructor Co., Ltd., Armley, Leeds.

Dredges and Excavators.
Delange & Cie, Mce., Hoboken, near Antwerp
Rose, Downs & Thompson, Ltd., Old Foundry, Hull.

Drilling Machines.
Asquith, William, Ltd., Well Road Works, Halifax.
Niles-Bement-Pond Co., 23-25, Victoria Street London, S.W.
Noble & Lund, Ltd., Felling-on-Tyne
Swift, George, Clarence Ironworks, Halifax.

Economisers.
E. Green & Son, Ltd., Manchester.

Ejectors (Pneumatic).
Hughes & Lancaster, 16, Victoria Street, London, S.W.

Electrical Apparatus.
Allgemeine Elektricitäts Gesellschaft, Berlin, Germany.
British Westinghouse Electric and Manufacturing Co., Ltd., Norfolk Street, Strand, London, W.C.
Broadbent, T. W., Victoria Electrical Works, Huddersfield.
Crypto Electrical Co., 3, Tyer's Gateway, Bermondsey Street, London, S.E.
Ebonestos Manufacturing Co., 22, Rosoman Street, London, E.C.
Gent & Co., Ltd., Faraday Works, Leicester.
Greenwood & Batley, Ltd., Albion Works, Leeds.
India Rubber, Gutta Percha, and Telegraph Works Co., Ltd., Silvertown, London, E.
Johnson and Phillips, Ltd., Victoria Works, Old Charlton, Kent.
Matthews & Yates, Ltd., Swinton, Manchester.
Mix and Genest, Berlin, W., Germany.
Nalder Bros. & Thompson, 34, Queen Street, London, E.C.
New Gutta Percha Co., Ltd., Dashwood House, New Broad Street, E.C.
Newton Brothers, Full Street, Derby.
Phœnix Dynamo Manufacturing Co., Bradford, Yorks.
Scott, E., & Mountain, Ltd., Newcastle-on-Tyne.
Turner, Atherton & Co., Ltd., Denton, Manchester.
B. Weaver & Co. (*see* Ebonestos Manufacturing Co.), 22, Rosoman Street, Clerkenwell, London, E.C.

Engineers' Supplies.
Ahlers, Ad., Whitley Bay, near Newcastle-on-Tyne.

Engines (Gas).
Campbell Gas Engine Co., Ltd., Halifax.
Cundall, Son & Co., Ltd., Airedale Iron Works, Shipley.

Engines (Electric Lighting).
McLaren, J. and H., Midland Engine Works, Leeds.

Engines (Locomotive).
Baldwin Locomotive Works, Philadelphia, Pa., U.S.A.
Hunslet Engine Co., Ltd., Leeds, England.
Hudswell, Clarke & Co., Ltd., Leeds, England.
McLaren, J. & H., Midland Engine Works, Leeds.

Engines (Stationary).
Allis-Chalmers Co., 533, Salisbury House Finsbury Circus, London E.C.
Fraser & Chalmers, Ltd., 3, London Wall Buildings, London, E.C.
Mirrlees Watson Co., Ltd., Glasgow.

Engines (Traction).
Jno. Fowler & Co. (Leeds), Ltd., Steam Plough Works, Leeds.

Engravers.
Jno. Swain & Son, Ltd., 58, Farringdon Street, London, E.C.

Exhaust Steam Oil Separators.
Lancaster & Tonge, Ltd., Pendleton, Manchester.

Fans, Blowers.
Capel Fan Co., 13, Moseley Street, Newcastle-on-Tyne.
Davidson & Co., Ltd., "Sirocco" Engineering Works, Belfast Ireland.
Gibbs, John & Son, 80, Juke Street, Liverpool.
Matthews & Yates, Ltd., Swinton, Manchester.

Files.
Flocktor, Tompkin & Co., Ltd., Newhall Steel Works, Sheffield.

Fire Bricks.
J. H. Sankey & Son, Ltd., Essex Wharf, Canning Town, London, E.

Firewood Machinery.
M. Glover & Co., Patentees and Saw Mill Engineers, Leeds
Hill and Herbert, Ltd., Great Central Street, Leicester.

Buyers' Directory—(*Continued*).

Fountain Pens.
Mabie, Todd & Bard, 93, Cheapside, London E.C.

Forging (Drop) Plants.
Brett's Patent Lifter Co., Ltd., Coventry.

Forgings (Drop).
J. H. Williams & Co., Brooklyn, New York, U.S.A.

Furnaces.
Deighton's Patent Flue & Tube Company, Vulcan Works, Pepper Road, Leeds.
Leeds Forge Co., Ltd., Leeds.

Gauge Glasses.
J. B. Treasure & Co., Vauxhall Road, Liverpool.
Tomey, J., & Sons, Aston, Birmingham.

Gauges (Pressure, Vacuum, and Hydraulic).
Dobbie, McInnes, Ltd., 45, Bothwell Street, Glasgow.

Gearing.
Ahlers, Ad., Whitley Bay, near Newcastle-on-Tyne.
Angus, G. & Co., Ltd., Newcastle-on-Tyne.
Asquith, William, Ltd., Well Road Works, Halifax.
Dixon, W. F., & Co., 60, Percival Street, C.-on-M., Manchester.
Reid Gear Co., Linwood, near Glasgow.
Wild, M. B., & Co., Corporation Street, Birmingham.

Gold Dredging Plant.
Fraser & Chalmers, Ltd., 3, London Wall Buildings, London, E.C.

Greases.
Blumann and Stern, Ltd., Plough Bridge, Deptford, London, S.E.

Hack Saws.
Baynes, Charles, Knuzden Brook, Blackburn.

Hammers (Steam).
Davis & Primrose, Leith Ironworks, Edinburgh.
Niles-Bement Pond Co., 23-25, Victoria Street, London, S.W.

Hoisting Machinery.
See Conveying Machinery.

Horizontal Boring Machines.
Asquith, William, Ltd., Well Road Works, Halifax.
Greenwood & Batley, Albion Works, Leeds.
Niles-Bement Pond Co., 23-25, Victoria Street London, S.W.
Noble & Lund, Ltd., Felling-on-Tyne.
Swift, George, Clarence Ironworks, Halifax.

Hydraulic Leather.
Ahlers, Ad., Whitley Bay, near Newcastle-on-Tyne.

Hydraulic Machine Tools.
Niles-Bement-Pond Co., 23-25, Victoria Street, London, S.W.
Vauxhall and West Hydraulic Engineering Co. Ltd., 23, College Hill, London, E.C.

Icemaking and Refrigerating Machinery.
H. J. West & Co., 114-118, Southwark Bridge Road, London, S.E.

Indicators.
Dobbie McInnes, Ltd., 45, Bothwell Street, Glasgow.
Hannan & Buchanan, 75, Robertson Street, Glasgow.

Iron and Steel.
Allen, Edgar, & Co. Ltd., Imperial Steel Works, Sheffield.
Askham Bros. & Wilson, Ltd., Sheffield.
Buckley, Saml., St. Paul's Square, Birmingham.
Fairley & Sons, James, Old Mint, Shadwell Street, Birmingham.
Farnley Iron Co., Ltd., Leeds, England.
Flockton, Tompkin & Co., Ltd., Newhall Steel Works, Sheffield.
Fried. Krupp, Grusonwerk, Magdeburg-Buckau, Germany.
J. Frederick Melling, 14, Park Row, Leeds, England.
Parker Foundry Co., Derby.
Purden, John & Sons, Lambhill Forge, by Maryhill, Glasgow.
Walter Scott, Ltd., Leeds Steel Works, Leeds, England.

Ironwork (Constructional).
F. A. Keep, Juxon & Co., Barn Street, Birmingham.

Ironwork (Galvanised).
F. A. Keep, Juxon & Co., Barn Street, Birmingham.

Lagging Sheets.
Zeitz & Co., 21, Lime Street, London, E.C.

Lathes.
Asquith, William, Ltd., Well Road Works, Halifax.
Bradbury & Co., Ltd., Wellington Works, Oldham.
Eclipse Tool Manufacturing Co., Linwood, near Glasgow.
Leckenby, Benton, & Co., Perseverance Ironworks, Halifax.
Mitchell, D., & Co., Ltd., Parsonage Works, Keighley.
Niles-Bement-Pond Co., 23-25, Victoria Street, London, S.W.
Noble & Lund, Ltd., Felling-on-Tyne.
Northern Engineering Co. (1900), Ltd., King Cross, near Halifax.
Swift, George, Clarence Ironworks, Halifax.

Lathe Carriers
Williams, J. H., & Co., Brooklyn New York, U.S.A.

Laundry Machinery.
Hill and Herbert, Ltd., Great Central Street, Leicester.
Summerscales, W., & Sons, Ltd., Engineers, Phœnix Foundry Keighley, England.

Lifts.
Waygood & Co., Ltd., Falmouth Road, London, S.E.

Lubricants.
Blumann & Stern, Ltd., Plough Bridge, Deptford, London S.E.
Reliance Lubricating Oil Co., The, 19 & 20, Water Lane, Great Tower Street, London, E.C.

Machine Tools.
Asquith, William, Ltd., Well Road Works, Halifax.
George Addy & Co., Waverley Works, Sheffield.
Bateman's Machine Tool Co., Hunslet, Leeds.
Beanland, Perkin, & Co., School Close Works, Leeds.
Bertrams, Ltd., St. Katherine's Works, Sciennes, Edinburgh.
Bradbury & Co., Ltd., Wellington Works, Oldham.
Breuer, Schumacher & Co., Ltd., Kalk, near Cologne-on-Rhine (Germany).
Consolidated Pneumatic Tool Co., Ltd., Palace Chambers, 9, Bridge Street, Westminster, S.W.
Cunliffe & Croom, Ltd., Broughton Ironworks, Manchester.
Dean, Smith & Grace, Ltd., Keighley.
Dempster, Moore & Co., Ltd., 49, Robertson Street, Glasgow.
Fengl, A., & Co., Grafton Street, Altrincham.
Greenwood & Batley, Ltd., Leeds.
Jones & Lamson Machine Co., 97, Queen Victoria Street, London, E.C.
John Lang & Sons, Johnstone, near Glasgow.
Luke & Spencer, Ltd., Broadheath, Manchester.
Jos. C. Nicholson Tool Co., City Rd. Tool Wks., Newcastle-on-Tyne.
Niles-Bement-Pond Co., 23-25, Victoria Street, London, S.W.
Noble & Lund, Ltd., Felling-on-Tyne.
Northern Engineering Co., 1900, Ltd., King Cross, near Halifax.
J. Parkinson & Son, Canal Ironworks, Shipley, Yorkshire.
C. Redman & Sons, Halifax.
Resides, 12, Aire Street, Brighouse, Yorks.
Rice & Co. (Leeds), Ltd., Leeds, England.
G. F. Smith, Ltd., South Parade, Halifax.
Swift, George, Clarence Ironworks, Halifax.
Taylor and Challen, Ltd., Derwent Foundry, Constitution Hill Birmingham.
Vauxhall and West Hydraulic Engineering Co., Ltd., 23, College Hill, London, E.C.
H. W. Ward & Co., Lionel Street, Birmingham.
T. W. Ward, Albion Works, Sheffield.
West Hydraulic Engineering Co. (see Vauxhall and West Hydraulic Engineering Co. Ltd.), 23, College Hill, London, E.C.
Winn, Charles, & Co., St. Thomas Works, Birmingham.
Yorkshire Machine Tool and Engineering Works, Liversedge, Yorks.

Machinery Merchants.
Greenwood, Thomas, Waterside, Halifax.

Marks.
Pryor, Edward, & Son, 68, West Street, Sheffield.

Metals.
Delta Metal Co., Ltd., East Greenwich, London, S.E.
Magnolia Anti-Friction Metal Co., Ltd., of Great Britain, 49, Queen Victoria Street, London, E.C.
Phosphor Bronze Co., Ltd., Southwark, London, S.E.

Metals (Perforated).
Brown, Andrew, & Co., 110, Cannon Street, London, E.C.
Méguin, Fr., & Co., Ltd., Engineering Works, Dillingen-on-Saar.

Mining Drill Steel.
Flockton, Tompkin & Co., Ltd., Newhall Steel Works, Sheffield.

Mining Machinery.
Fraser & Chalmers, Ltd., 3 London Wall Buildings, London, E.C.

Office Appliances.
Davis, John, & Son, Ltd., 30, All Saints' Works, Derby.
Halden & Co., J., 8, Albert Square, Manchester.
Hall & Co., B. J., 39, Victoria Street, London, S.W.
Inglesant, T., & Sons, Ltd., Atlas House, Leicester.
Lyle Co., Ltd., Harrison Street, Gray's Inn Road, London, W.C.
Rockwell-Wabash Co. Ltd., 69, Milton Street, London, E.C.
Shannon, Ltd., Ropemaker Street, London, E.C.
Trading and Manufacturing Co., Ltd., Temple Bar House, Fleet Street, London, E.C.

Oils, &c.
Blumann and Stern, Ltd., Plough Bridge, Deptford, London, S.E.

Oil Filters and Cabinets.
Valor Co., Ltd., Rocky Lane, Aston Cross, Birmingham.

Packing.
Beldam Packing & Rubber Co., 93-94, Gracechurch Street, London, E.C.
Lancaster & Tonge, Ltd., Pendleton, Manchester.
Redfern & Co., S., Swan Lane, New Brown Street, Manchester.
Quaker City Rubber Co., Coronation House, Lloyd's Avenue, E.C.
United States Metallic Packing Co., Ltd., Bradford.

Paper.
Lepard & Smiths, Ltd., 29, King Street, Covent Garden, London, W.C.

Patent Agent.
Lorrain, J. G., M.I.E.E., M.I.Mech.E., Norfolk House, Norfolk Street Strand, London, W.C.

Buyers' Directory—(*Continued*

Photo Copying Frames.
J. Halden & Co., 8, Albert Square, Manchester.
B. J. Hall & Co., 39, Victoria Street, London, S.W.

Photographic Apparatus.
Marion & Co., Ltd., 22 and 23, Soho Square London, W.

Pinch Bars.
Samson & Co., Garforth, near Leeds.

Pipe Wrenches (Chain).
Williams, J. H., & Co., Brooklyn, New York, U.S.A.

Pistons.
Lancaster & Tonge, Ltd., Pendleton, Manchester.

Planished Sheets.
Zeitz & Co., 21, Lime Street, London, E.C.

Pneumatic Tools.
Consolidated Pneumatic Tool Co., Ltd., Palace Chambers, 9, Bridge Street, Westminster, S.W.

Porcelain.
Gustav Richter, Charlottenburg, near Berlin, Germany.

Presses (Hydraulic).
Greenwood & Batley, Albion Works, Leeds
Niles-Bement-Pond Co., 23-25, Victoria Street, London, S.W.

Publishers.
Charles Griffin & Co., Ltd., Exeter Street, Strand, London, W.C.
Spon, E. and F. N., 125, Strand, W.C.
New Zealand Mines Record, Wellington, New Zealand.

Pulley Blocks.
Kramos Ltd., Locksbrook Engineering Works, Bath.

Pumps and Pumping Machinery.
Drum Engineering Co., 33, Brook Street, Bradford.
Enke, Carl, Schkeuditz-Leipzig, Germany.
Fraser & Chalmers, Ltd., 3, London Wall Buildings, London, E.C.
J. P. Hall & Sons, Ltd., Peterborough.
Hathorn, Davey & Co., Ltd., Leeds, England.
Positive Rotary Pumps, Ltd., 23, Northumberland Avenue, London, W.C.

Radial Drilling Machines.
Asquith, William, Ltd., Well Road Works, Halifax.
Greenwood & Batley, Albion Works, Leeds.
Mitchell, D., & Co. Ltd., Parsonage Works, Keighley.
Niles-Bement-Pond Co., 23-25, Victoria Street, London, S.W.
Noble & Lund, Ltd., Felling-on-Tyne.
Northern Engineering Co. (1900), Ltd., King Cross, near Halifax.
Swift, George, Clarence Ironworks, Halifax.

Rails.
Wm. Firth, Ltd., Leeds

Riveted Work.
F. A. Keep, Juxon & Co., Forward Works, Barn Street, Birmingham.

Roller Bearings.
Hyatt Roller Bearing Co., 47, Victoria Street, London, S.W

Roofs.
D. Anderson & Son, Ltd., Lagan Felt Works, Belfast.
Clayton, Son & Co., Ltd., Hunslet, Leeds.
Head, Wrightson & Co., Ltd., Thornaby-on-Tees.
McTear & Co., Ltd., Newtownards Road, Belfast.

Ropeways (Aerial).
Bullivant & Co., Ltd., 72, Mark Lane, London, E.C.
Pohlig, J., Ltd., Cologne, Germany.

Scientific Instruments.
Cambridge Scientific Instrument Co., Ltd. Cambridge

Slotting Machines.
Noble & Lund, Ltd., Felling-on-Tyne.
Swift, George, Clarence Ironworks, Halifax.

Spanners.
Williams, J. H. & Co., Brooklyn, New York, U.S.A.

Stampings.
Thomas Smith & Sons of Saltley, Ltd., Birmingham.
Williams, J. H., & Co., Brooklyn, New York, U.S.A.

Stamps (Rubber).
Rubber Stamp Co., 1 & 2, Holborn Buildings, Broad Street Corner, Birmingham.

Stamps (Metal).
Edward Pryor & Son, 68, West Street, Sheffield.

Steam Traps.
Lancaster & Tonge, Ltd., Pendleton, Manchester.

Steam Wagons.
Thornycroft & Co., Ltd., J. I., Chiswick, London, W.
Yorkshire Patent Steam Wagon Co., Pepper Road, Hunslet, Leeds

Steel Structures.
Ashmore, Benson, Pease & Co., Ltd., Stockton-on-Tees.
Clayton, Son & Co., Ltd., Hunslet, Leeds.

Steel Tools.
Saml. Buckley, St. Paul's Square, Birmingham.
Pratt & Whitney Co., 23-25, Victoria Street, London, S.W.

Steel (Tool Steel).
Flockton, Tompkin & Co., Ltd, Newhall Steel Works, Sheffield.

Stokers.
Ed. Bennis & Co., Ltd., Bolton, Lancs.

Stone Breakers.
S. Pegg & Son, Alexander Street, Leicester.

Superheaters.
A. Bolton & Co., 49, Deansgate, Manchester.

Testing Machines.
Denison, Saml., & Son, Ltd., Hunslet Moor, near Leeds.

Time Recorders.
Howard Bros., 40, Paradise Street, Liverpool, and 100b, Queen Victoria Street, London, E.C.

Tubes.
Thomas Piggott & Co., Ltd., Spring Hill, Birmingham.
Tubes, Ltd., Birmingham.

Turbines.
Greenwood & Batley, Albion Works, Leeds.
S. Howes Co., 64, Mark Lane, London, E.C.

Typewriters.
Empire Typewriter Co., 77, Queen Victoria Street, London, E.C.
Yost Typewriter Co., 50, Holborn Viaduct, London, E.C.

Valves.
Holmes & Co., W. C., Huddersfield.
Hopkinson, J. & Co., Ltd., Britannia Works, Huddersfield.
Hunt & Mitton, Crown Brass Works, Oozells Street North Birmingham.
Scotch and Irish Oxygen Co., Ltd., Rosehill Works, Glasgow.
Shaw, Joseph, Albert Works, Huddersfield.
Winn, Charles, & Co., St. Thomas Works, Birmingham.

Ventilating Appliances.
Matthews & Yates, Ltd., Swinton, Manchester.

Water Softeners and Purifiers.
Lassen & Hjort, 52, Queen Victoria Street, London, E.C.

Wagons—Steam.
Thornycroft & Co., J. I., Ltd., Chiswick, London, W.
Yorkshire Patent Steam Wagon Co., Pepper Road, Hunslet, Leeds.

Weighing Apparatus.
W. & T. Avery, Ltd., Soho Foundry, Birmingham, England.
Denison, Saml., & Son, Ltd., Hunslet Moor, near Leeds.

Wells Light.
A. C. Wells & Co., 100A, Midland Road, St. Pancras, London, N.W.

Wire Ropes.
Bullivant & Co., Ltd., 72, Mark Lane, London, E.C.

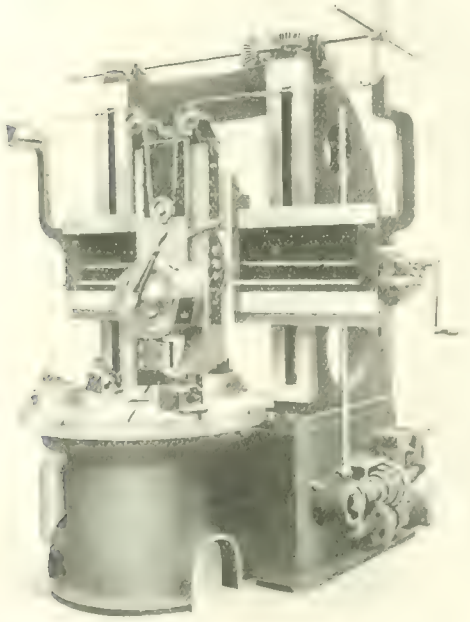
Wire Working Machinery.
Ed. Brand 35, Shakespeare Street, Manchester.

"Woodite."
"Woodite" Company, Mitcham, Surrey.

PAGE'S WEEKLY

Miscellaneous

CUNLIFFE & CROOM, Ltd.



42-inch
Turning & Boring Mill

Admits to diameter	42 in.
Diameter of Circular Table	40 ,,
Admits to height under Cross Slide	40 ,,
Traverse of Turret Slide [illegible]	22 ,,
,, ,, Vertical Slide ...	20 ,,
Eight changes of feed, vertically and horizontally.	
Gear Power (increasing [illegible]	2 in. to 4
5 speed Cone [illegible]	in. to 10 in. dia.
Width of Belt	3½ in.
Slide Swivels to	[illegible]
Capstan Block for five tools.	
Six [illegible] holes in Turret	[illegible]
Speed of Countershaft	120 and [illegible]
Approximate Weight ...	[illegible]

Is also made with two heads on Crossrail.

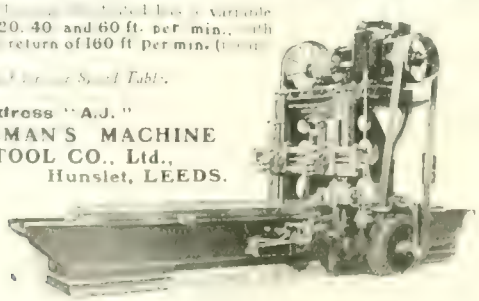
MANCHESTER.

BATEMAN THREE-SPEED PLANERS

[illegible] Variable cut of 20, 40 and 60 ft. per min., [illegible] with return of 160 ft. per min. [illegible]

[illegible] Square Steel Table.

Address "A.J."
BATEMAN'S MACHINE TOOL CO., Ltd.,
Hunslet, LEEDS.



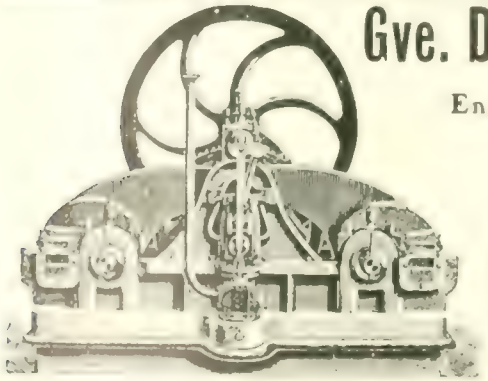
GREENWOOD & BATLEY, Ld.

LEEDS.

Machine Tools.

Dynamos & Motors.

De Laval's Patent Steam Turbines.



Gve. DETOMBAY, Mce. DELANGE & Cie.

Engineering Works, HOBOKEN, near ANTWERP.

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Hartness Automatic Die

This Die is not only used on all Hartness Flat Turret Lathes, but is also suitable for use on all other makes of Turret Lathes. The new No. 4 is admirably suited to Automatic Machines.

Cam takes bearings direct on back of Chaser, insuring almost perfect lead.

Chasers can be instantly changed.

The adjustment is the easiest of any Die on the market.

All regular Chasers for Screwing Dies, together with many special and Acme sizes, kept constantly in stock.

Write to-day giving particulars of your requirements to

JONES & LAMSON MACHINE CO.

"Jardine Building," 85, Queen Victoria Street,

LONDON.

Index to Advertisers.

Advertisements not appearing this week will be found by reference to the preceding or following issues, with the exception of those appearing monthly.

Index to Advertisers—(Contd.)

PAGE'S WEEKLY

Packings, Lubricants, &c.

PAGE'S WEEKLY

An Illustrated Weekly Journal devoted to the Engineering, Iron and Steel, Mining, Electrical and Shipbuilding Industries.

VOL. VIII. LONDON, FRIDAY, FEBRUARY [illegible] No. [illegible]

The Offices of "Page's Weekly."

Wednesday evening.

THE [illegible] of the Royal College of [illegible] the realisation of an imperial college of technology. It will be noted that the committee, having arrived at the conclusion that our educational facilities and co-ordination are both [illegible]

[illegible] ment of University [illegible]

of the empire, and should, therefore, be free from all impeding trammels founded upon [illegible] little changing tra[illegible]

[illegible]

consider that a system of control common to both the new institutions and the university, could not be formulated without such compromises as would seriously imperil the efficiency of both.

Those who think the new institution should pass as soon as may be under the control of the University, urge that "it would be a very serious step to check a spontaneous movement, which," is said to be "healing the divisions and rivalries that have hindered the progress of University education in London for three-quarters of a century, by reverting to the principle of dual or multiple control, which, experience has shown, tends neither to economy nor efficiency." Another objector says—"Since it is recommended that the new institution shall be (as each of its existing component parts already is) a school of the University of London, the Report contemplates no change in the degree-giving power of the University. There would, however, evidently be danger of friction between the University and a powerful school if each were regarded by the other as external to itself." There are, of course, other pros and cons.

The report has a memorandum signed, "Walter McDermott, W. H. White, W. de W. Abney," and "A. H. Leech," recording the opinion of these gentlemen that "it is vital to the success of the new Institution that its organisation and equipment for the part it is to play in technical education should be entrusted, for a minimum period of five years, to a special governing body, such as is recommended in the report; that the uninterrupted action of that body should be assured during this period; and that inquiry, by Royal Commission or otherwise, should be deferred until experience has been gained in actual working. Even if amalgamation with the University of London should be eventually decided upon, they are of opinion that the continuance of a special governing body, whose constitution would be in substantial agreement with the recommendation of the report, would be preferable to government by the Senate of that University. They consider that in order to ensure the complete success of the scheme, it is absolutely necessary that as close a relationship as possible shall be maintained between the heads of the various industries of the country and the new Institution; and for that purpose it is of vital importance that the proposed representation on the governing body of engineering and other societies shall be active and permanent." The late Sir Edward Carbutt was, it appears, in favour of an independent governing body.

Memorandum B, signed "Reay" and "Arthur W. Rücker," sets forth that the opinion that "it is desirable, in the interests of higher education and of the new Institution, that steps should be taken as soon as possible to incorporate it in the University of London." It added that "the engineering profession would gain increased representation on the Senate and be brought into closer touch with all technological education of University rank in London. On the other hand, the general supervision of the Senate would afford a guarantee that interests other than those directly connected with the South Kensington site would be respected. In the past, competition between the State-supported Royal College of Science and other institutions has been prevented by charging high fees at the former. If this safeguard is abolished, it should be replaced by the unification of all the financial interests involved under the ultimate control of the Senate."

Before the Manchester University Engineering Society, at a recent meeting, Mr. W. Noble Twelvetrees discussed the safety of iron and steel roofs with particular reference to the recent Charing Cross disaster. Indications are not wanting, said the author, that the fashion for monumental roofs is distinctly on the wane, so far as railway stations

grades of the Lanville type. The total width

of almost all the squadrons stationed in more distant seas the returns have suffered heavily by comparison. The four ships heading the gunnery list are respectively the *Formidable*, 3748 points; *Queen*, 3222; *Leviathan*, 2688; and *King Edward VII.*, 2614. The new return of the order of the fleets and squadrons in battle practice is as follows:—

Order of Merit.	Squadron.	No. of Ships.	No. of Guns.	Average Points.
	Channel ..	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]
3	Mediterranean .	12 .	[illegible]	[illegible]
4	Atlantic ..	[illegible]	176 .	[illegible]
	China ..	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	6 ..	88 .	[illegible]
[illegible]	[illegible]	6 ..	76 .	[illegible]
	[illegible]	[illegible]	14 .	[illegible]
[illegible]	East Indies .	[illegible]	[illegible]	[illegible]
	[illegible] Hope	4 .	[illegible]	

According to Mr. Percy F. Martin, F.R.G.S., in the Financial News, although no section of the foreign community is more popular in Mexico than the British, our country is only a bad fourth on the list of foreign countries doing trade with Mexicans. He notes that one corporation—the Mexican Light and Power Company, Ltd., which is Canadian, and therefore British—has elected to place an extensive order for electrical machinery with an American firm, although, probably had British firms at home put themselves to the same trouble to secure the contract, by sending out a representative and studying the situation, as did an American Company, it might, at least, have succeeded in part. The Germans and the Americans are now sharing between them the several big orders which are being given out for railway material and electrical installations, there being an enormous amount of activity among the various constructional trades.

THE "MAN-EATER" LEOPARD AT THE LANGLAGIL DEEP

[illegible] description of this [illegible] in the [illegible] of PAGE'S WEEKLY.

PAGE'S WEEKLY

An Illustrated Weekly Journal devoted to the Engineering, Iron and Steel, Mining, Electrical and Shipbuilding Industries.

DAVIDGE PAGE, Editor.

Offices: Norfolk House, Norfolk Street, Strand, London, W.C.

Subscription Rates per Year.

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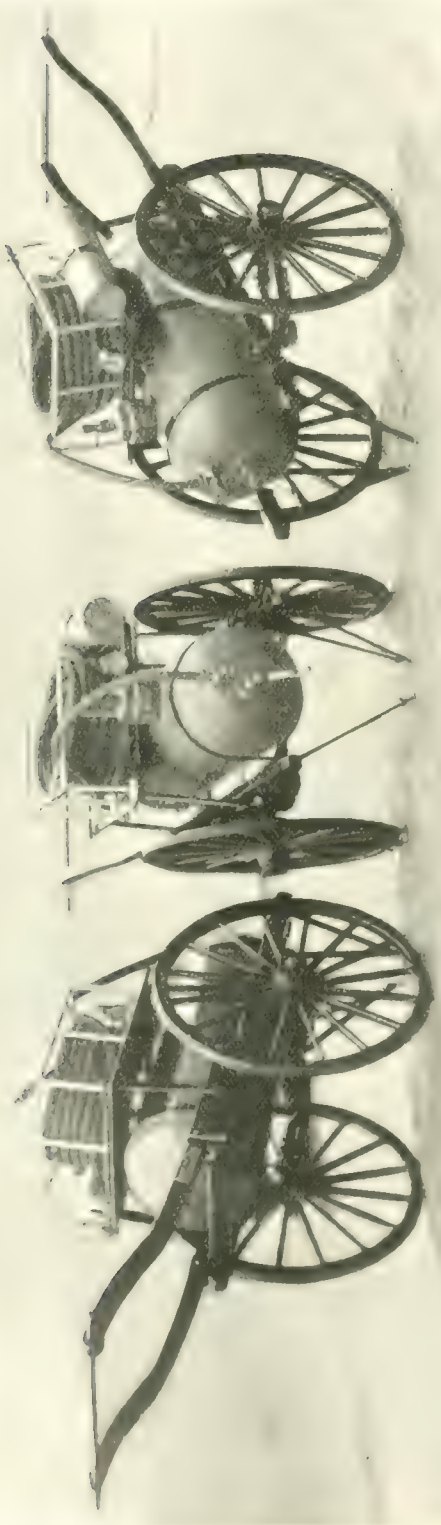
Personal Pars.

New Chemical Fire Engines.



NEW CHEMICAL FIRE ENGINE RECENTLY CONSTRUCTED BY MESSRS. MERRYWEATHER AND SONS FOR THE WAR OFFICE.

We illustrate on this page a new pattern chemical fire engine recently designed and constructed by Messrs. Merryweather and Sons of London to the order of H.M War Office. These are part of an order for over twenty engines for the protection of depots and are built for hand draught. The chemical cylinders are of hammered copper, well tinned inside to resist acid and each is provided with gunmetal filling cap on which is mounted a safety valve and which also gives access to the cradle in which a lead bottle for the acid is carried. The lead bottle is closed by a metal capsule held by a screw cap and placed upside down in the cradle. In the centre of the cylinder is a shaft on which is mounted a pricker and also a fan. By means of an outside handle this shaft is revolved, piercing the metal capsule and thus allowing the acid to fall into the soda solution which is kept in the cylinder ready for use. The fans also revolve with the shaft and thoroughly mix the charge. A delivery valve is provided, and the hose attached is carried in a cradle mounted over the cylinder. In the centre of this cradle is a second acid bottle and on the side a canister for a second charge of soda. The capacity of the cylinder is 60 gallons which will maintain a high pressure jet for 10–12 minutes. The stream can be thrown with all or any part of the hose coiled in the cradle and the branch pipe is fitted with shut-off nozzle. The frame is of strong pattern, mounted on steel springs and high wheels for rapid travelling. It has a drag handle for men, shackles being provided fitted for hauling ropes when additional men are required. These engines are instantaneous in action, and would appear to be very suitable as first-aid appliances in engineering works.

Mr. William Ward, British Consul-General at Hamburg, attributes the present demand for British coal in Germany to the greater activity prevailing in most branches of German industry, and to the insufficient number of railway trucks in Western German coal districts for the transport of German coal to the interior, as well as to the seaports of the country. It is considered that the present active demand for British coal will continue for some months to come; but it is quite [illegible] last.

Personal Pars.

News Items.

Railway Construction in Canada.

According to a report issued by the United States Consul at Chatham, Ontario, a scheme of railway construction in Canada, which will require from three [illegible] total of 7,344 miles. The mileage and estimated cost of construction, in English equivalents, are distributed as follows: Canadian Pacific, 1,844 miles, costing £8,330,000; Canadian Northern, 1,280 miles, costing £5,800,000; Grand Trunk Pacific, 3,720 miles, costing [illegible] Grand Trunk [illegible] miles, costing £800,000; Northern Pacific, 300 miles, costing £1,800,000. The work projected in the above programme, together with that included in the electric railway projects which are expected to be undertaken, will necessitate about 1,000,000 tons of 80lb. rails in the next four years, and, in addition, 300,000 to 400,000 tons of iron and steel for car and locomotive building, switches, trestles, and bridges. It is further estimated that in the present year Canadian railways will require over 100,000 tons of bridge material for renewing and strengthening bridges, the Grand Trunk Railway alone needing for this purpose 30,000 tons.

The Conveyor Bridge across the Tees.

At the River Tees Commissioners' meeting at Middlesbrough recently, the Parliamentary Committee reported the result of negotiations with the Parliamentary agents and the promoters of the proposed conveyor bridge across the Tees and light railway from Middlesbrough to Hartlepool. The promoters agreed that the bridge and railways should form one undertaking, and should be constructed simultaneously; that the bridge should have a clear headway of 175ft.; that the passage of the transporter car across the river should not take more than 1¼ minutes; and that a five minutes' service should be established. It was resolved, on the motion of Sir Robert Ropner, seconded by Sir Hugh Bell, that the clear headway of the horizontal girders crossing the river Tees should be 100ft. above H.W.O.S.T. for a width of 300ft. in the centre of the river, the curve of the headway at each end of the horizontal width of [illegible] ft. to be shown as upon the plan.

Improved Signalling Apparatus.

During the past two or three months some interesting experiments have been in progress on the [illegible] improved apparatus for indicating in the cab of a [illegible] comotive the position of the arms of distant signals. The apparatus, which is fitted to a goods engine, gives both "all right" and "danger" signals, and is designed to work on both single and double lines. An Atlantic-type engine has also been fitted with the apparatus, and some trials at high speed on the main line are about to be made, the result of which will be watched with interest. The system has been entirely worked out by members of the company's staff.

The "Adriatic."

Messrs. Harland and Wolff are already establishing another shipping record. The White Star liner *Adriatic*, now under construction at the Queen's Island, will have a tonnage of 25,000 and a length of 710½ ft., a breadth of 75 ft. and a depth of 50 ft. She will be the largest vessel in the world. The following table gives the tonnage of the world's largest vessels —

	Tons.
Adriatic (White Star) building ..	[illegible]
[illegible] (White Star)	[illegible]
Amerika (German)	23,000
Cedric (White Star)	21,000
Celtic (White Star)	20,904
Minnesota (United States)	20,716
Carmania (Cunard)	20,000
[illegible] *II.* (German) ..	[illegible]
Caronia (Cunard)	19,594
[illegible] (White Star)	17,274
[illegible] (German)	[illegible]
La Provence (France)	15,000
[illegible] (German)	[illegible]
Campania (Cunard)	12,950

[illegible] and late of Alston Villa, Portsmouth Road, Woolston, Southampton, naval architect to Messrs. John J. Thornycroft and Co., Ltd., engineers and shipbuilders, who died on December 4th last at Renfrew intestate, left personal estate in the United Kingdom valued at [illegible]

The 44th Congres de Sociétés Savantes will be [illegible] 2 p.m. It will be held until the Friday, and on the Saturday it will be concluded by a meeting in the great amphitheatre of the Sorbonne, presided over by the Minister of Public Instruction and Fine Arts.

It is reported that the Toyo Kisen Kaisha of Japan [illegible] five liners of the Pacific Mail Steamship Company, in order to compete with a German steamship company.

Mr. Laurence Pitblado, M.Inst.M.M., left London [illegible] properties in Peru and the Argentine Republic. He expects to be absent from England for some six or eight months.

An Imperial College of Technology.

Final Report of the Departmental Committee.

THE Departmental Committee appointed on the 4th of April, 1904, to inquire into the present and future position of the Royal College of Science, including the Royal School of Mines, and also into certain questions connected with the University of London, and to report what steps should be taken to secure the future efficiency of the College as a part of a scheme of education for the Empire, have presented their report, a copy of which has been laid before Parliament. The Committee consisted of the Right Hon. Sir Edward Fry, G.C.B., F.R.S. (Chairman), Sir Norman Lockyer, K.C.B., F.R.S., Sir Hugh Bell, Bart., Sir Frederick Bramwell, Bart., F.R.S., Sir Alexander Kennedy, F.R.S., Sir Philip Magnus, M.P., Sir Richard Threlfall, F.R.S., Sir Robert Hadfield, Bart., F.R.S., Mr. Alfred Yarrow, F.R.S., Mr. Alfred Keogh, C.B., Mr. Arthur Acland, M.P., Mr. Sydney Buxton, M.P., Mr. Llewellyn Smith, C.B., Mr. Robert Blair, Mr. Francis Darwin, F.R.S., Mr. Arthur Harbord, Mr. Trevor Dickinson, Mr. Arthur Shipley, M.A., and Mr. Alexander Siemens, with Mr. Philip Magnus as Secretary.

NEED FOR UNIVERSITY TRAINING IN THE SCIENCES APPLICABLE TO INDUSTRY.

CHANGE IN THE ATTITUDE OF EMPLOYERS AND PARENTS.

some variety in the methods by which higher technical education may be supplied.

NEED OF CAREFULLY DEFINED AIMS

In any consideration of the provision which we hope to see made for this purpose, it will be well to bear in mind, as a first principle, that an essential condition of a good technical education of whatever grade is a good general education of the corresponding preliminary grade. In the second place, care must be taken to avoid any confusion between the aims of general and of technical education. The trend of recent developments in England in the sphere both of elementary and of secondary education has been in the direction of removing this confusion, but in the sphere of education higher than secondary it is open to question whether the confusion has not increased rather than diminished in the past few years. We do not mean that a general education should never take account of the prospective occupation of the student, or that a technical education should be devoid of all elements of general culture; the point of principle is that in every educational institution, or in every faculty of a university, one aim or the other should be avowedly predominant. The scheme which we shall proceed to submit is framed with a due

COMBINATION OF CIRCUMSTANCES TRENDING TO THE INQUIRY

Before summarising the conclusions at which we have arrived, we desire to recall the special combinations of circumstances which have led to the institution by the Government of the present inquiry. Perhaps we shall not be far wrong in saying that the determining factor instituting this inquiry at the present time was the approaching completion, at a cost, exclusive of site, of over £25,000, of the new laboratories and buildings of the Royal College of Science. If proper advantage was to be taken of the expenditure of this very large sum, it had become a pressing question to settle the future scope and functions of the college. Another factor, in many respects of greater importance, although not in its nature so immediately pressing, was the munificent offer conveyed through Lord Rosebery to the London County Council about two years ago, for the provision on the South Kensington site, that is to say, in immediate proximity to the new laboratories of the Royal College of Science, of a school of the most advanced instruction in applied science.

The coincidence of these two events would, by themselves, have sufficed to raise educational questions of the highest imperial importance. In addition, the rapid growth of the gold-mining industry in South Africa, and the insufficient provision for the education of the British mining engineer as compared with his foreign competitors, have forced attention upon the condition and equipment of the Royal School of Mines, and it has become evident that large sums would be necessary to restore this old established and famous school to its former relative position—a position corresponding with that held by this country in the mining industry of the world. In this connection we should desire incidentally to call attention to the useful inquiry into the necessities of an Imperial School of Mines, which was undertaken about three years ago by the Institution of Mining and Metallurgy, and also to record with satisfaction that we understand that the resources of the recently inaugurated Bessemer Memorial Fund will, to a considerable extent, be made available for the purposes of such a school. Further, from the educational point of view, the centre of gravity of the South Kensington site has been to some extent affected by the installation, in 1900, of the central offices of the University of London in the buildings of the Imperial Institute.

The urgency of some of the questions thus raised, the occurrence of the recent events described, and the proximity of other institu-

CONCLUSIONS AND RECOMMENDATIONS

INCLUSION OF THE ROYAL COLLEGE OF SCIENCE AND ROYAL SCHOOL OF MINES

FINANCIAL AND OTHER SUPPORT.

The favourable disposition of the Government has greatly strengthened our position, and enabled us to obtain the support and co-operation which we consider necessary to ensure the success of the scheme described generally in our Preliminary Report. The gift of a capital sum in excess of the minimum referred to in Section III. of that Report has been secured.

The Commissioners of the 1851 Exhibition are prepared, if satisfied with the scope and constitution of the new institution, to place at the disposal of its governing body the unoccupied portion of their estate at South Kensington.

The Council of the City and Guilds of London Institute have indicated their willingness to bring the Central Technical College into a scheme to be framed to their satisfaction on the general lines we are able to recommend in this Report.

CO-OPERATION OF THE L.C.C.

We attach the highest importance to the co-operation of the London County Council, as the local education authority, and with regard thereto the most cordial assurances were given at an early stage of the movement. The Council, on July 27th, 1903, received a report from its General Purposes Committee upon the proposal contained in the letter which Lord Rosebery had a short time previously addressed to the Chairman of the Council—a proposal, the essential features of which are incorporated in our scheme—and passed a resolution expressing "its high appreciation of the important proposal," and its welcome of the establishment of further provision in London for advanced technological teaching and research." It further resolved to place on record its opinion that, subject to certain conditions being fulfilled (about which we may say we do not anticipate any difficulty), the Council would be well advised, when the time came, to contribute a sum not exceeding £20,000 per annum towards the maintenance of the institution.

SUFFICIENT MAINTENANCE FUND.

In our opinion a sufficient maintenance fund is assured, at any rate, to justify a commencement, if not to carry out the scheme we have in view as fully as we hope may be possible hereafter.

ESSENTIAL FEATURES OF THE NEW INSTITUTION.

As stated in our Preliminary Report, we have inquired into the working of the Royal College of Science and the Royal School of Mines, but we have done so with a definite end in view. We think it appears from the answers we have received from the Board of Education to the questions we ventured to ask in that Report, taken in conjunction with the terms of reference, that it is the desire of His Majesty's Government that the staff of the Royal College of Science, including the Royal School of Mines, together with the buildings and appliances now in occupation or in course of construction at South Kensington, should be utilised to the fullest extent for the promotion of higher scientific studies in connection with the larger scheme which we endeavoured to sketch in outline in our Preliminary Report. We have now to make, so far as appears to us possible, recommendations with regard to the essential features in the constitution and purposes of the new institution which we propose should be created, and with regard to the position of the several bodies brought with it under a common government and administration.

ITS MAIN OBJECT.

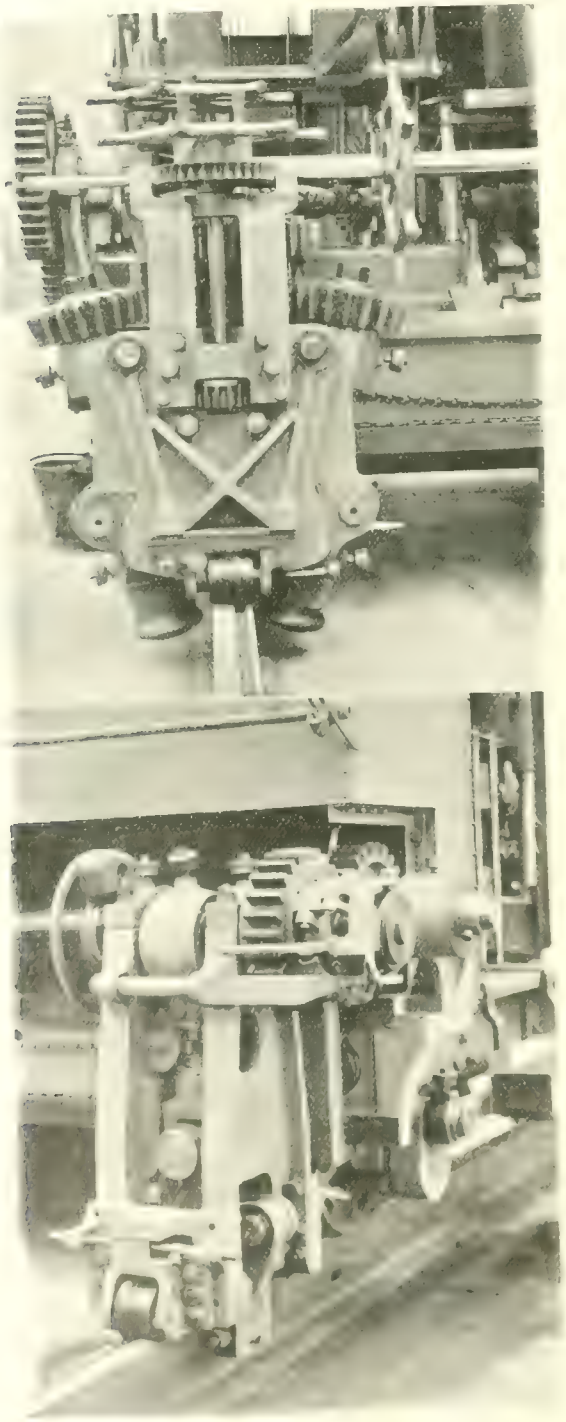
The main object is the establishment, at South Kensington, of an institution or group of associated Colleges, of Science and Technology, where the highest specialised instruction should be given, and where the fullest equipment for the most advanced training and research should be provided, in various branches of science,

(*Continued on page 315.*)

Compound Tramway Rails.

The Romapac System

matter; it obviates the cutting away of fish-plate [illegible]



[illegible] SIDE OF THE ACHARD.

cent., the breaking away of concrete, cutting sole plate bolts, the removal of sole plates, and the cutting and waste of copper bands. A minimum interference with traffic is thus secured.

The application of the various inventions comprised in the system will be understood on reference to the accompanying diagrams and by the following details from the patent specifications.

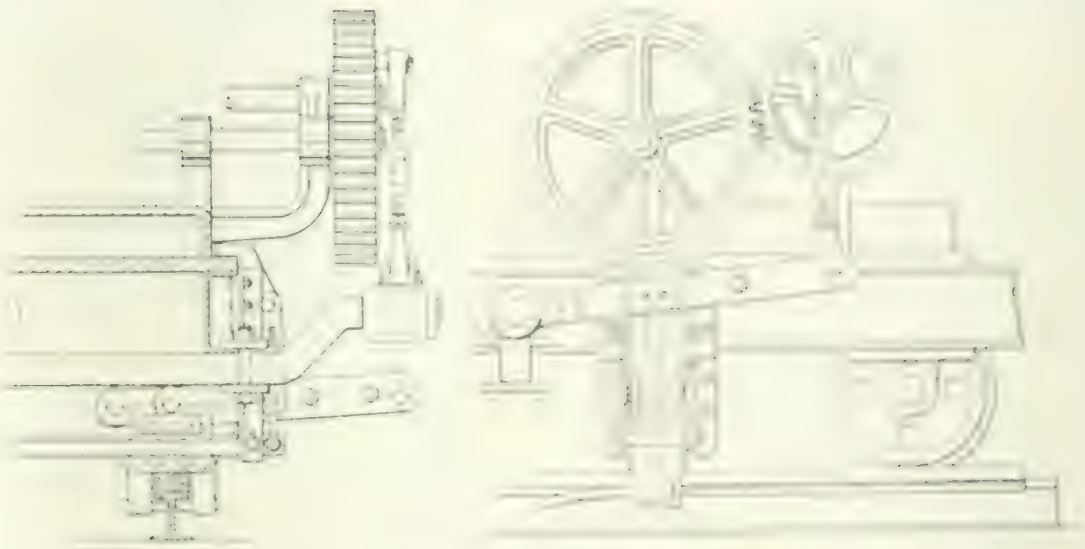
FIXING THE WEARING PORTION OF THE COMPOUND RAIL.

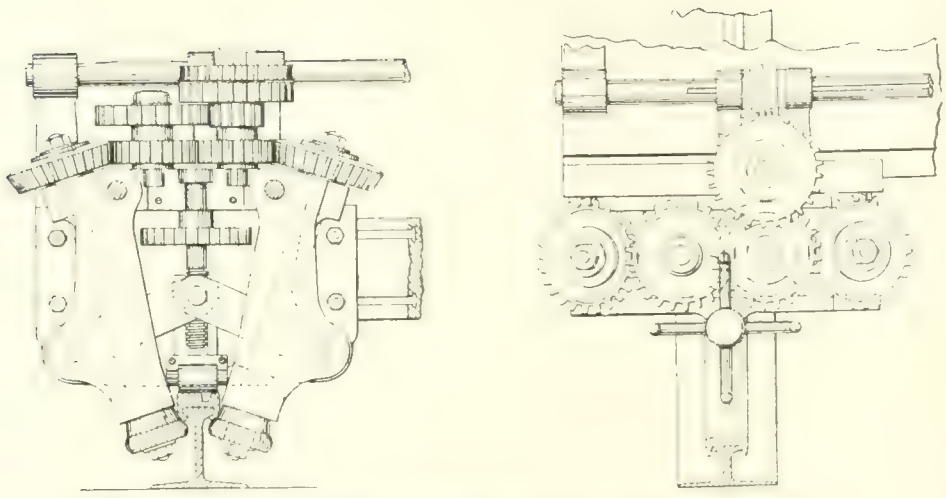
For this purpose a carrying frame is employed, to which two oppositely situated arms are pivoted at their upper ends. Each of these pivoted arms is provided with suitable bearings in which is mounted a shaft, and to the lower end of each shaft below its pivoted carrying arm is attached a roller, roughened on its periphery, whilst the upper ends of the shafts are provided with suitable gear wheels which are driven by intermediate gearing, the latter being driven by suitable speed gearing from the driving shaft of the engine. The pivoted arms are connected together by means of toggle levers, which latter are attached to a central nut which is actuated by means of a screw through suitable gearing in connection with a hand operating wheel or its equivalent, and the frame is provided with a guide roller which runs in contact with the upper surface of the top portion of the rail.

The upper or wearing portion of the rail, which is of channel section, is placed on the head of the girder portion, with the flanges depending. The engine causes the serrated rollers to revolve. They are drawn inwards against the flanges of the top rail, and are bent inwards and pressed firmly round the head of the base rail, while at the same time the bogie with its appliance is caused to travel forward by the grip or frictional contact of the serrated rollers on the flanges of the upper rail as the machine travels along, pressing the flanges of the top rail inwards and round the head of the base rail as the machine travels along. The contact faces of the wearing portion and head of the foundation portion are arranged to grip each other firmly by means of longitudinal grooves which are formed in the sides of the head of the base portion of the rail, and transverse grooves in the inside of the depending flanges of the upper portion of the rail.

CUTTING-OFF APPARATUS.

The patent cutting apparatus provides that, when the engine is set in motion, a set of guide rollers is forced tight on to the upper sides of the rail, after which disc cutters are fed into the side or flange of the wearing portion. The rollers, by reason of their grip or frictional contact on the rail, cause the bogie with its





DETAILS OF APPARATUS FOR FIXING THE WEARING PORTION OF RAIL.

appliance to travel along the rails, when the cutters come into action on the wearing portion. An arrangement is provided for simultaneously breaking away the partially-cut flange as the machine travels along, whereby the upper or wearing portion is severed, and rendered removable.

Mr. J. B. Hamilton, the General Manager of the Leeds City Tramways, is of opinion that the system is "quite practicable and capable of rolling not only on the straight, but on any curves which would occur in practice. He has estimated the cost of relaying with the present girder rail, and, presuming that the estimate given for the rolling on and cutting off of the top section is correct, and that the cost of the Romapac rail is the same as for the girder rail, an economy of 53½ per cent. is indicated; this in addition to the rapidity with which a section of rails can be relaid at the least possible inconvenience to the general public, and the lessening of rail movement through loosening at the joints, owing to the joint at the top section and the joint of the under section being staggered.

The results of a test to ascertain the pressure necessary to slide the top section off the bottom section of a combined rail one foot long have been furnished by the Sheffield Testing Works, Ltd., and are shown in the following table.

Test No.	Description.	Weight per foot.	Length of sliding surface of Rail.	Pressure applied, in Tons. Movement of top section over the bottom section.			Remarks.
		Pounds.	Inches.	16·32 tons	18·21 tons	23·30 tons	
R 4445	Combined Rail as per sketch.	38	12·0	·02	·12	·26"	The top section commenced to move with a pressure of 16·32 tons, and with a pressure of 18·21 tons the movement was 12". With a pressure of 23·30 tons the movement was ·26", and on the test being continued the top section kept sliding off the bottom section without any further increase of pressure

The Steam Locomotive Fifty Years Ago and Now.

By Samuel Rendell, M.I.Mech.E.

T[illegible] Great Central.

[illegible] design of large modern locomotives; [illegible] boiler and compounding, and closing with a query on the probable future of railway motive power.

According to returns made at the [illegible]

[illegible]	[illegible]
North-Western	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

[illegible]

[illegible]

TABLE I.—LEADING PART[illegible]

FIG. 11. OUTLINE ROGERS' "ATLANTIC" TYPE.

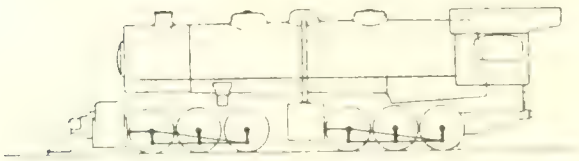


FIG. 12. MALLET COMPOUND ARTICULATED.

the Baltimore and Ohio Railroad. Unlike the passenger engines above, this conforms to the heavy goods type, having been constructed for hill-climbing on the company's section over the Alleghany Mountains. For want of sufficient space the tender, built by the Railroad Company, is omitted.

Table I. gives the leading particulars of the twelve locomotives just referred to, and, leaving out the "Rocket" and the big American machines, it clearly indicates how the dimensions of passenger engines in common use on the four railways named have increased during the past fifty years from, say, cylinders of 16 in. diameter and heating surface of 900 square feet, to cylinders of 19 in. diameter and heating surface of 2,000 square feet, the pressures at the same time rising from 100 lb. to 180 lb. per square inch, and the weights loaded (without tender) from 23 to 60 tons.

PASSENGER ENGINE TYPES.

[illegible] far as wheel arrangement is concerned, by a system of notation which is now often used in this country and America. For all ordinary types three figures suffice, the first and last of which represent the number of bogie or carrying wheels at the leading end and at the trailing end respectively; if none, the statement is made definite by the use of a 0. The middle figure indicates the number of driving or coupled wheels. The "Waverley," for example, is a "single-driver," with a pair of leading carrying wheels and a pair of trailing carrying wheels. It is therefore represented by

[illegible] pound have each four coupled wheels, with [illegible] no carrying wheels in the rear; they are [illegible]. The L. and Y. G. C. and American "Atlantic" types have four coupled wheels, four wheeled leading bogie, and two trailing carrying wheels; they are 4—4—2. The American Compound has two groups of six coupled wheels, and no carrying wheels either leading or trailing; four figures are required to express this, namely, 0—6—6—0.

The letters over the numerals indicate whether the cylinders are outside (outs.), or inside (ins.), or compound (comp.); in the last case the number of cylinders is stated as, "3-comp." or "4-comp."

The capacities of the two American tenders are given in English or Imperial gallons of 277 cubic inches, or 10 lb. of water. The gallon still used in the United States is the Old British or "Winchester" wine gallon of 231 cubic inches, or 8⅓ lb. of water. The capacity of each of these tenders is 7,000 U.S., or 5,830 English, gallons.

In table IV. there is worked out for each engine the tractive effort, and the relative proportions of boiler surfaces to one another and to the cylinders, taking the area of one cylinder only, as perhaps the fairest basis, seeing that, owing to the cut-off, the two cylinders are practically alternately fed with steam from the boiler, and neglecting the stroke, because a longer stroke is generally regarded, not as put in to draw more steam from the boiler, but rather to increase the expansion.

THE INCREASE IN TRACTIVE EFFORT.

Neglecting for the moment the "Rocket" and the American engines, the table shows that the passenger locomotives now in use on the four railways named, exert tractive efforts two and a half times as great as those of fifty years ago; in other words, a pull of, say, two and a half tons, has been increased to six and a half tons.

The latest L. and N.-W. engine, the "Precursor," is seen to be equal, in hauling capacity, to twenty-two "Rockets," and the gigantic American compound, to forty-six, all upon the same gauge of rails.

Confining attention again to the English locomotives of fifty years ago and to-day, it will be observed that, allowing for exigencies of design, the boiler proportions have remained fairly uniform, roughly confirming the old rules which allowed about ten square feet of tube surface to one square foot of firebox, about sixty square feet of total heating surface to one square foot of fire-grate, and about five square

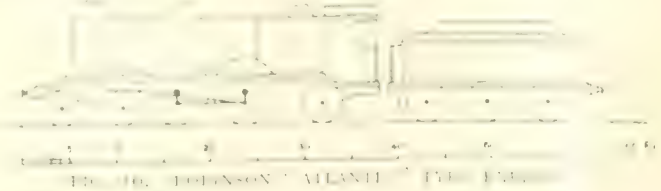
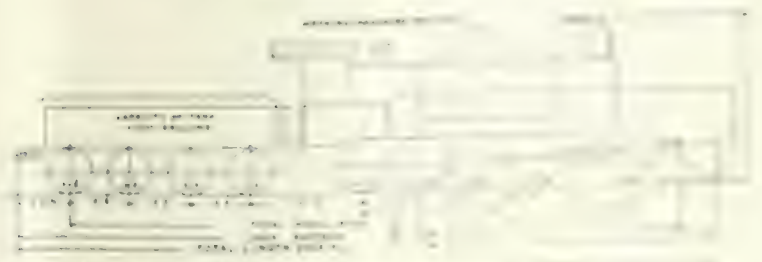


FIG. 13. [illegible] "ATLANTIC" [illegible]

THE PROBLEM BEFORE LOCOMOTIVE ENGINEERS



TYPES OF [illegible] ENGINES

Railway.	No.	Name.	Date.	Type.	Tractive Effort at 85 lbs. per Sq. In. Boiler Pressure.	Adhesive Weight on Coupled Wheels.	Total Weight of Engine in Working Order.	Ratio. Tractive Effort to Adhesive Weight.	Ratio. Adhesive Weight to Total Weight.	Cylinders. Diameter and Stroke.	Heating Surface. Total in Tubes and Fire-box.	Grate Area.
					lbs.	tons.	tons.			ins.	sq. ft.	sq. ft.
L. & N. W.		—	1859	Outside 2—2—2	18·7	37·5	62	5·9	23·0	50·2	2·7	12
L. & N. W.		1879	1879	Outside 2—2—2	61·6	90·0	52·0	9·0	61·6	182·6	4·6	·07
Do.		"Waverley"	1863	Outside 2—2—2	75·8	90·0	60·9	11·9	73·2	226·9	4·8	·06
L. & Y.		"Lancashire"	1905	Inside 4—4—0	115·8	131·25	135·7	11·5	89·7	283·5	7·1	·08
M. R.		"John Steel"	1847	Inside 2—2—2	77·5	60·0	41·5	11·7	83·5	201·0	4·5	·05
Do.		2—2	1902	3 Comp. 4—4—0	Equivalent 89·3	146·25	116·6	9·6	61·4	Dia. 1·0 283·5	7·0	·03
L. & Y.		—	1855	Inside 2—4—0	71·7	75·0	48·0	9·6	65·2	176·7	5·1	·08
L. & Y.		1400	1902	Inside 4—4—2	107·8	131·25	126·3	10·6	79·0	285·5	7·2	·09
G. C.		—	1847	Inside 0—4—2	93·8	75·0	62·7	11·6	75·3	201·0	4·2	·05
Do.	10	266	1901	Outside 4—4—2	122·0	135·0	147·0	11·6	74·2	298·6	6·4	·08
Argentine Great Southern R.	11	1017	1901	Outside 4—4—2	141·7	150·0	189·7	16·9	63·7	314·1	10·2	·16
American B. & O. R.R.	12	2400	1904	4 Comp. 0—6—6—0	Equivalent 182·8	176·25	287·6	24·4	77·5	2 20in. dia. 628·2	8·9	·11

TABLE II.—TRACTIVE EFFORTS AND BOILER PROPORTIONS OF LOCOMOTIVES IN TABLE I.

The G. C. has also eight wheels coupled, but the cylinders are outside and 19 in. diameter.

Two very successful locomotives built by Beyer, Peacock and Co. for the New South Wales Government Railways, of 4 ft. 8½ in. gauge are to the designs of Mr. Thow, Chief Mechanical Engineer. Fig. 13 is a "ten-wheeled" passenger engine with outside cylinders 20 in. diameter, six wheels coupled, and a leading four-wheeled bogie.

Fig. 14 is a goods engine, of a type known as the "Consolidation," with outside cylinders 21 in. diameter, eight wheels coupled, and a leading two-wheeled bogie. The first lot were put in service in 1896, and at the end of 1904 there were eighty-nine.

[illegible] motive, eleven of which were built by Beyer, Peacock and Co. in 1902 for the Buenos Ayres Great Southern Railway in South America, of 5 ft. 6 in. gauge, to the designs of Mr. Gould, Locomotive Superintendent.

Fig. 17 is a combined diagram, constructed from indicator cards, taken from the high and low pressure cylinders respectively.

The following particulars of the trial have been supplied:—

The load was entirely of wheat in bags. The engine hauled the train up gradients in 1 in 120 and 1 in 200, but in most cases was assisted by the inertia of the [illegible]

Total number of axles hauled, 112.
,, ,, vehicles, 29.
,, length of train, 1,091 ft.
,, weight ,, [illegible]

On another occasion the performance of one of these [illegible] on a level was

Total number of axles hauled, 252.
,, ,, vehicles, 102.
,, length of train, 2,640 ft.
,, weight ,, [illegible]

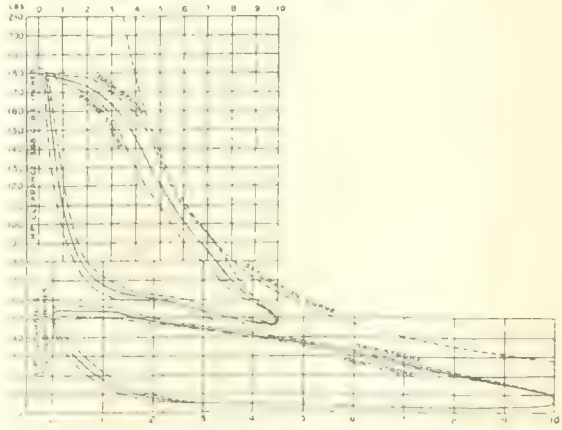


FIG. 17.—COMBINED DIAGRAM CONSTRUCTED FROM INDICATOR CARDS.

THE LOCOMOTIVE BOILER.

tion in the way of heavier jointing and

[illegible]		Equivalent 137·6	[illegible]	13·2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] S.		[illegible]	156·3	10·4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] & Y.		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
G. C.		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Fig. 13	173·3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
L. & S. W.	16	Equivalent 135·2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
M. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] & Y.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
G. C.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
N. So. Wales	Fig. 13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
L. & S. W.	16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

blocks. The advent of the hydraulic flanging press, and the more general use of steel plates, much simplified the flanging operation, and now Belpaire boxes are commonly used, as, for instance, on the following engines illustrated, namely, Midland Passenger, L. and Y. and G. C. Passenger and Goods, Dutch, New South Wales, and Great Southern.

The vertical stays in a Belpaire fire-box are often subject to severe corrosion near the inner crown. Fig. 17 shows the lower portion of a stay taken from one of the G. C. engines, the dotted line representing the original shape. To combat this action the railway company are dropping short tubes over the stays, as they are inserted in the box, and filling up the small annular space between each stay and tube with Portland cement. The same method has been used by others, and, it is said, with success.

After long trials of several materials, many railway companies now use boiler tubes made of copper, as were those in the "Rocket." The Midland chiefly use copper, and the L. and N.-W. use either copper or steel, depending on the nature of the water in the district in which an engine will work.

On the Midland Railway no boiler blow-off cocks are used. To empty the boiler a wash-out plug must be drawn, which cannot safely be done while the water is hot, and so the inner plates are saved from damage through being sprayed with cold water when at a high temperature.

COMPOUND LOCOMOTIVES

A few words ought to be said about compound locomotives. Of the engines tabulated, the Midland passenger is a Smith's three cylinder compound, the high-pressure inside, and two low-pressure outside, all connected to the front coupled axle. The L. and N.W. [illegible] Webb's three-cylinder compound, has one outside H.P. cylinders, and two inside L.P. cylinders, all driving the leading coupled axle. The B. A. Great Southern goods is a two-cylinder compound, both outside.

Many compound locomotives have been built in Manchester. Beyer, Peacock and Co. have built about 300, including some conversions of engines, already delivered, to compounds. With the exception of one Webb's three-cylinder, all these were Worsdell and Von Borries' two-cylinder, compounds. As already stated, one of the Dutch engines was a compound, and so were two of the New South Wales passengers. In this latter case the cylinders were outside, and the L.P. was so big that it had to be made into a twin cylinder, [illegible] These two locomotives were subsequently converted

The writer has found that, in some cases of compound locomotives, which were working beside corresponding simple engines, and, as far as could be ascertained, were of equal power, the ratio of the area of H.P. cylinder × working pressure in compound to the area of simple cylinder × working pressure in simple was approximately as 100 to 80. Hence the rule for equivalent tractive effort made use of in the various tables.

Much might be said for and against compound locomotives, but there is no consensus of opinion, and probably never will be. The continually varying duty of a locomotive is so very different from that of either a marine or stationary engine that comparison fails.

Abstract of paper read before Manchester Association of Engineers

A New Fire Float.

The new fire float, "Beta," which has been built for the London County Council by Messrs. Forrestt and Co., at Wyvenhoe, from the designs of Mr. F. J. Trewent, naval architect to the London Fire Brigade, has undergone the necessary trials. The "Beta" is 100 ft. long, with a beam of 16 ft. 6 in., and a water-draught of 40 in. This low draught will enable her to pass under the bridges at all states of the tides. She is fitted with twin-screw engines, and two water-tube boilers of the Mumford type. On her trials she steamed twelve miles per hour, and with only one boiler in use at over eleven miles per hour. The "Beta" is fitted with four fire pumps, which give a discharge of 4,000 gallons of water per minute, at 140 lb. pressure per square inch. This is at the rate of over 1,000 tons of water per hour. The machinery is by Messrs. Mumford, of Colchester, and the fire pump by Messrs. Shand, Mason and Co.

Turbine Locomotive.

It is reported that Professor Johannes Stumpf of the Konigliche Technische Hochschule, Charlottenburg, Germany, has secured patent rights for the adaptation of the steam turbine to locomotives. He proposes to divide up the turbine into stages, distributed one on each driving axle of the locomotive, and the steam from the boiler to pass through the several stages in succession. A turbine is mounted on the axle on the outside of each driving wheel. With three driving axles the steam is conveyed by a pipe from the boiler to the first turbine on the one side, then to the other two turbines in succession on that side. It is then conveyed to the three turbines in succession on the other side of the locomotive, from the third of which the steam leads the exhaust to the exhaust blast nozzle.

Shipbuilding News.

engined by Messrs. Workman, Clark and Co., for the Ocean Steamship Company, Ltd., of Liverpool, left the Milewater Wharf on the 1st inst. preparatory to having her speed trials and adjustment of compasses. The *Bellerophon* is a unique-looking vessel, having no masts for carrying rig, but being provided with four tall pillars, placed two abreast forward and aft for carrying derricks, and between the two forward posts a bridge has been fitted near the head for look-out purposes. The new vessel has a gross tonnage of about 9,000 tons. The propelling machinery consists of two sets of the latest type of triple-expansion engine, supplied with steam from double ended multitubular boilers working under the owners closed ashpit system of forced draught. After a successful cruise the *Bellerophon* proceeded to Glasgow, where she will take in cargo for her initial trip to China and Japan.

The *Siegmund*, a steel screw steamer recently launched by Irvine's Shipbuilding and Dry Docks Company, Ltd., proceeded to sea for her trial trip last week. The vessel is intended for the North and South American trade and is of the following dimensions: length, 332 ft., breadth, 45 ft. and depth, 24 ft. 9 in. moulded, class 100A to Germanischer Lloyds highest class. Engines of the triple expansion type have been supplied and fitted by Richardsons, Westgarth and Co., Ltd., Hartlepool, having cylinders 23½ in., 31 in. and 64 in. diameter by 42 in. stroke, steam being supplied by t

She then proceeded to New York.

The outfit will include seven powerful steam w

The vessel has cellular double bottom a

Cartridge Case Heading Press.

By the Vauxhall and West Hydraulic Engineering Company, Limited.

THE press illustrated on page 305, was specially designed for heading and indenting cartridge cases for large-size quick-firing ammunition, and is in use by a leading firm of ordnance makers. The accompanying sketch shows a section of the cartridge at the various stages of these processes.

Figure A represents a case which has been cupped and drawn to the required dimensions, and trimmed. In order to finish the work it is necessary to reform the metal in the solid end of the case, to provide a projecting flange for the ejector and a central indent for the primer. This requires three operations, known respectively as first indenting, second indenting, and heading, the formation of the case after each operation being shown in figures B, C, and D.

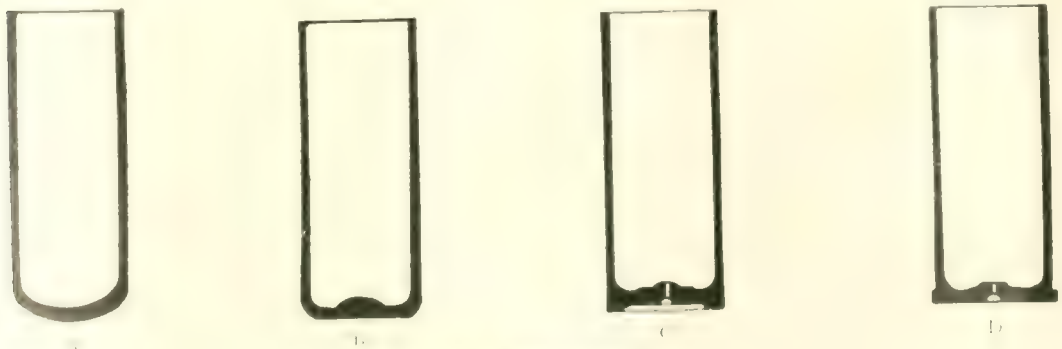
The press, as shown in the illustrations, consists of a massive head and base, in a specially toughened mixture of cast-iron. The top entablature forms also the main cylinder, which is inverted, and carries an inverted ram, which is attached to the crosshead guides with adjustable slippers working on the main columns of the press.

To the lower surface of the crosshead is attached an anvil block, the lower end of which is arranged to carry a revolving die plate, and is provided with a specially-hardened steel end. The base of the press is a massive cored casting, through which passes an ejector ram, which is suspended with its cylinder in the pit below the press, as shown.

The rotating table is carried in a chamber machined for this purpose on the upper surface of the base ; it is a special forging of gun-steel, and in its turn supports the die plate, which is also a forging of a special quality of steel, the two being centered by a hard steel spindle, passing through the base of the press.

The table and die block can be rotated to 180 degrees, the latter being fitted with two dies diametrically opposite each other, so arranged that when one die is under the centre of the main ram, the other is over the ejecting ram, adjustable stops being provided to ensure accurate alignment in each position.

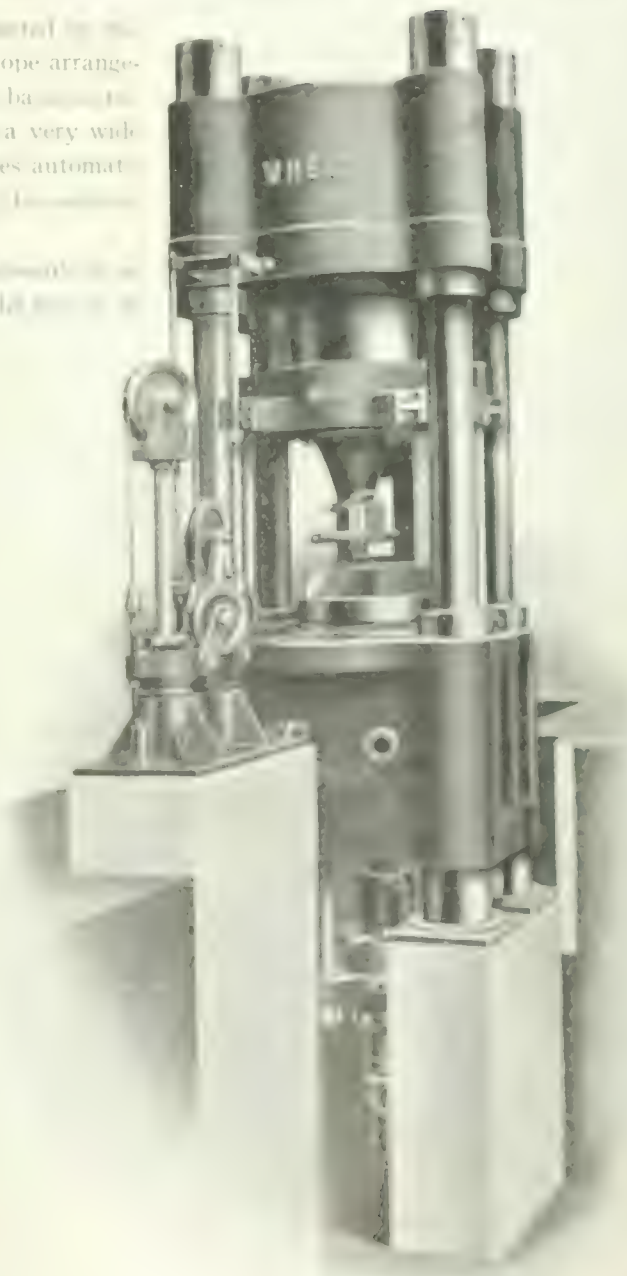
The return of the main ram is effected by two cylinders, and rams arranged one on each side of the base, the cylinders being connected direct to the hydraulic pressure main, so that

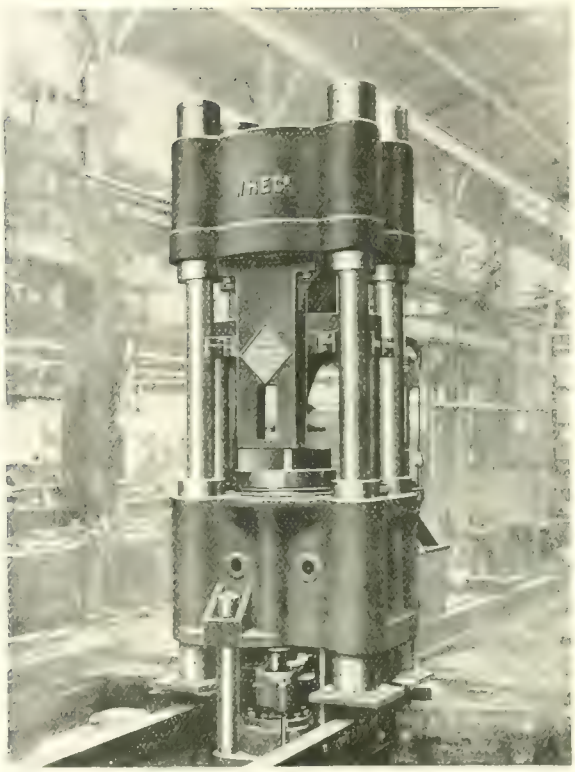


on the crosshead, and thus raise the latter whenever the valve of the main cylinder is open to exhaust.

vertical jigger cylinders and wire rope arrangement seen in the position at the back of the press, an arrangement which gives a very wide margin for adjustment and provides automatic

stroke, and the ejecting ram at the bottom of its stroke,





BACK VIEW OF PRESS

the heading die in position, produces the final shape shown at D.

During this operation of the main ram, the case that has been finished by the previous operation, has been ejected by the ejector, and a fresh case replaced in position in the other side of the die block, so that after the heading is completed the block is rotated through 180 degrees, and the finished case is ready for ejection, while a fresh one is ready for heading and

The weight of the press as described is about 55 tons, and a feature of especial importance is embodied in the design; viz., that all ram packings can be replaced or examined in any part of the press, without dismantling any portion of the machine, or breaking a single pipe joint. It is one of the products of the Hydraulic and Arsenal Machinery Department of the Vauxhall and West Hydraulic Engineering Company, Ltd.

Obituary.

Lord Masham, of Swinton Park, Masham, Yorkshire last Friday. The late peer, had just completed his ninety-first year. He was educated privately, and on leaving school adopted a commercial career. He became the patentee of many inventions, including the compressed-air brake for railways and the wool-combing machine. Lord Masham was a large land-owner, a colliery proprietor, and chairman of the Manningham Mills, Bradford, one of the largest silk and woollen industries in the world, employing about 4,000 hands. He refused a baronetcy in 1887 and was raised to the peerage in

Sir William Thomas Makins, Bart. (deputy-chairman of the Great Eastern Railway Company (died at Henley on Friday after a lengthy illness. The deceased baronet, who was sixty-five years of age, sat in Parliament from 1874 to 1892, representing in turn South Essex, South-east Essex, and South-west Essex. He was created baronet in 1892.

Correspondence.

TRADE MARKS IN AUSTRALIA

To the Editor of PAGE'S WEEKLY.

SIR,—We think it may be of considerable interest to your readers to know that the new Trade Mark Act has been passed in Australia, and, according to cable messages received, that it will come into force on May 1st of this year. Under the new Act one trade mark may be obtained which applies to the whole of Australia, including Tasmania. Though State trade marks are still in existence for a time, it is advisable for early application to be made under the Commonwealth Act

(1) The State registration expires at the time when ordinarily renewal fees would be due.

(2) If applications are not made, registration may be obtained under the Commonwealth Act by unauthorised persons, and great expense incurred by the rightful owners in obtaining their rights under the Act.

(3) In the absence of proof of fraud, registration is conclusive evidence of ownership after five years.

(4) A claim for damages on account of infringement cannot be made against an offending party unless the first mark, if registrable, is entered on the register.

We are,

Yours faithfully,

Our Weekly Biography.

CHARLES BRIGHT, F.R.S.E., M.I.E.E.

ability and work, but also by his active and beneficial participation in the controversies of various learned societies, including papers read before the Institution of Civil Engineers, the British Association for the Advancement of Science, the Society of Arts, the London Chamber of Commerce, and the Royal United Service Institution. Mr. Bright is also a frequent lecturer, having delivered lectures on various subjects to the Royal Military School at Chatham, the Navy League, Toynbee Hall, and elsewhere.

He is an enthusiastic supporter of all enterprises having for their object the multiplication of cables, uniting the heart of the Empire with its Colonial members, and it will be remembered that for some years he urged the necessity for the great Pacific Cable, and also reported on the subject for the Colonial Office. Mr. Bright commenced practice as a consulting engineer in 1895, since when he has been engaged with sundry electrical undertakings in connection with cable work and otherwise. He has reported on a variety of schemes for proposed new lines, both from an engineering and electrical standpoint, which have, in some instances, since become accomplished facts. He has also drawn up specifications and plans for the full equipment of electric light and power on a self-contained basis, involving some £15,000, besides inspecting and supervising every stage of the work.

He served as engineer to the Queensland Government in connection with the Greater Britain Exhibition, designing for them, *inter alia*, an electrically-worked mercury fountain, which attracted considerable attention, being the first device of that character; for this he was awarded a gold medal. In conjunction with the late Sir Frederick Bramwell, Sir Douglas Galton and others, he also served as juror to the Hull Electrical Exhibition the following year.

[illegible] Imperial Cable Communications Committee, this evidence being specially referred to and acknowledged in their official report. He has made researches concerning the behaviour of copper, gutta percha and india-rubber under various physical and mechanical influences. In addition to an aluminium sheathed cable and a telephonic recorder, he has designed a core for giving increased working speed. In the course of a practical experience in every department of telegraphy, he has also effected other devices for meeting special circumstances, particulars of which may be found in his report on "Underground Cables."

As a strong believer in centralisation of labour and its factories, Mr. Bright serves on the council of the Garden City Association; in like capacity, he is associated with the newly-formed Ambidextral Culture Society; and it will be recalled that to his energetic movement is due the fact that the International Submarine Telegraph Memorial was befittingly—rather than otherwise—carried out He is the possessor of an excellent library of scientific books; and he is proud of his unique collection of press cuttings relating to electrical science and engineering dating back to the inauguration of the electric telegraph, and including much concerning the latest development of wireless telegraphy, about which he takes broader views than many "cable men."

Mr. Bright is essentially a "travelled man" of wide interests. Thus, as a keen politician he is member of the Council of the Liberal Unionist Association and vice-president of two branches of the Tariff Reform League, having written and given addresses in favour of Imperial Preference. He is joint managing director and engineer of the Maxim Electrical Company; and, in addition to being a Fellow of the Royal Society of Edinburgh, he is a corporate member of the Institution of Civil Engineers and of the Institution of Electrical Engineers, besides being a Fellow of the Royal Astronomical and Geographical Societies.

[illegible] Leander Club in rowing, and still plays cricket for the M.C.C.

High-Speed Electric Machinery.

lecture dealing with high-speed electrical machinery with special reference to steam turbines.

speeds which had been brought about by the introduction of the steam turbine involved a good many

and construction of alternators might be said to depend

HIGH REVOLUTION AND CENTRIFUGAL FORCE

THE VENTILATION PROBLEM

could not have fine wire windings on the field magnet. It [illegible] embedded that they could not shift; and, being thick, they were consequently few, and therefore carried a large current, which, in its turn, implied that the energy must be given to them at a low voltage. One other word had to be said, and that was with regard to the output co-efficient, which, in the case of turbo-alternators, was only about one-half or one-third as great as in the case of machines of the old type.

OLD AND NEW TYPES.

Professor Thompson then showed a large number of views of old and new type alternators, tracing the development from the days of the slow-speed machines at the Manhattan Station, New York, which ran at 75 revolutions per minute down to the modern high-speed type. The work of Parsons and of Brown, who was responsible for the adoption of "Parsons" turbine on the Continent, of the Westinghouse Company, the Curtis turbines built by the British Thomson-Houston Company, The General Electric Company, The Oerlikon Company, Siemens-Schuckert, Dick Kerr and Co., was referred to, and their designs illustrated. A table dealing with the utilisation co-efficient was also exhibited. It was shown that the watts per cubic inch of the active belt in the old type of alternator driven by reciprocating engine ranged between 53 and 81, while with the turbo-alternator the figures varied from a lowest of 158 to a highest of 288, while the peripheral speeds which in the old type of alternator ranged between 5,000 and 9,800 ft. per minute, with the new type went as high as 15,100.

It was quite certain, said Professor Thompson in conclusion, whatever the critics might say, and however much engineers might object to these high speeds, that the steam turbine had come for good into the electrical industry. It has not been shown that there was any particular advantage from the point of view of steam consumption, and it was not in that respect that he would claim any particular advantage. The advantages were that you gained in simplicity in construction, and there were those other advantages to which reference had been made. He could not close his series of lectures without saying how much he had [illegible] by the extraordinary genius and tenacity of purpose displayed by Mr. Parsons in pioneering his way not only through the steam problems, but also through the electrical problems in connection with turbo-[illegible]

A cordial vote of thanks to the lecturer terminated

Transvaal Institute of Mechanical Engineers.

The following [illegible] elected — Messrs. E. A. Pack, B. J. Donellan, J. Askew, A. F. Eliel, E. W. Brackenbury, C. Fraser, J. A. MacGeorge, A. L. Cooper, and W. R. Snow. New Associate Members are Messrs. J. Allan Woodburn, A. B. Ritchie, D. L. Patrick, C. H. Thompson, and H. P. de Pencier.

Argyle Motors.

For the new season several alterations and improvements have been introduced into Argyll cars. Prominent amongst these may be noted an alteration in the shape of the dashboard, the widening of the side doors, and the fitting of a luggage slide on the rear of the car. A new worm quadrant steering gear has been devised, and the back axle has been redesigned, with an axle case of T-type and ball bearings throughout. A new gear-box with roller bearings may also be mentioned, as well as a new arrangement of striking gear for working the leather clutch. The levers are attached to the forward end of the gear-box. The back brakes have now a cam action instead of a toggle, and a new method has been adopted of fixing the front ball races on the axle; the bearings are also protected by dust and water shields. In the 16–20-h.p. models a new type of internally-expanding foot-brake entirely encased and protected, has been introduced, and special attention has been given to the lubrication of the ends of the springs and radius rods.

Motor Transport in Bolivia.

The possibilities of motor transport in countries like Bolivia is called attention to by a correspondent of the Mining Journal. The cart-roads would require, on the mountainous sections, alterations to permit motor transport. Only two-wheeled carts are in use, and the [illegible] a 6-metre curve sufficing at the rapid turns from one piece of road to another which is parallel to the former. Motors have passed from La Paz to Oruro—50 leagues [illegible] where traffic is relatively abundant, and it is rather astonishing that by this time they have not taken the place of the mule diligence, which does the journey in two [illegible] be covered by motors without any difficulty in the river beds, which nearly all roads follow over considerable distances, but this advantage would be largely lost by coming across a piece of hilly ground before dropping [illegible]

The Selection of Material for the Construction of Hydraulic Machinery.

By Arthur Falkenau

HYDRAULIC PRESSES

solved, and expedited the machine to the customer's works. The next morning we were informed that the cylinder was leaking badly, and on inspection found that our customer was using oil, and that the oil oozed through the cylinder at an apparently greater rate than the water had done originally. I suppose that the oil must have had some dissolving effect upon the starch. As we had had such unsatisfactory results with the air-furnace iron, I concluded that the only rapid solution of our trouble would be some other way of sealing up the pores of the cylinder. As the leak indicated, the porosity was mostly at the bottom of the cylinder. We therefore had the inside of the cylinder towards the bottom brazed by the ferrofix process. This proved entirely successful, and the cylinder has remained sound ever since. I understand that in the case of steel cylinders the sealing by means of the thermit process has been successful.

VALVES AND PUMPS.

In valves and pumps, where water under high pressure attains a high velocity, it has been a general experience that grey iron and steel are frequently subjected to peculiar cutting action. According to my own observation, this cutting action has been decidedly more rapid and marked when two dissimilar metals were in contact; thus in the loss valves which we built we originally used steel valves and bronze bodies. In several instances, after a year or two, we found the steel valve apparently eaten out as if by an acid. In one particular instance, believing that acid or grit in the water was the cause of the trouble, a water filter was put in place, and only pure filtered was used throughout the system. The new steel valves were soon eaten as badly as the former ones. It may be that some tannic acid washing out of the leather packings had something to do with this action, or the action may be of an electric nature. We replaced the steel valves by bronze ones, so that two like metals were in contact, and no further trouble was experienced. I have examined samples showing this peculiar pitting action which, as the location showed, could not have been caused by the impact of the water, due to high velocity in passing out of the valve. Still, the fact that this action occurs near the point of efflux, and not so much elsewhere, might lead one to discountenance the electric couple theory. This peculiar action, I believe, has been observed by a great many engineers, but does not seem to have been satisfactorily explained. For small structures under high hydraulic pressures, say from 3,000 to 8,000 lb., forgings are far more satisfactory than any castings, and I have found bronze under these high pressures unsatisfactory solely to the low or uncertain elastic limit of the same. The castings seem to gradually expand and get leaky, although figured with a factor of safety of 8 to 10 based on the ultimate strength.

LEATHERS

The material to be used for packing is also an important consideration. Where "U" or cup leathers are used a close-grained flexible leather is desirable; of course, such leathers should not be taken except from the middle of the back of the animal. Leather treated with paraffin has given good results. There is no doubt that the method of preparation of the leather is an important factor in its imperviousness to water and I have within recent years tried the Vim leather, which has given better results than any I had heretofore used. The manufacturers of the Vim leather claim that their peculiar process of tanning preserves the fibre and brings the fibres into close contact. The process of tannage is one of oxidation by the use of a mineral, and for this reason the leather is not affected by oxide of iron, as are oak and hemlock tanned leathers. For light pressures the leather is furnished without any filter, but for high pressure the leather is filled with a lubricant which primarily hardens the leather and renders it more impervious. It is claimed that owing to the process of tanning the Vim leather will absorb 45 per cent. of lubricant as compared with 15 per cent. absorbed by oak-tanned leather. Furthermore, in moulding the leather no water is used, the leather being heated and thus sufficiently softened. The leather is not affected by hot water.

The blame for the failure of leathers, however, is frequently not chargeable to the material, but to the construction of the metal against which the leather rests. The "U" leather should, as far as possible, be backed by the metal over its curved portion, and should have either a metallic ring or hemp or other material inserted between the flaps. Furthermore, the surface over which the leather runs should be as smooth as possible. Some constructors, in building cylinders in which pistons travel, line them with brass, aiming at the double purpose of furnishing a smooth surface and covering any porous structure which may appear in the grey-iron or cast-steel cylinders. Where leathers are used in valves in such a way that the cross ports the construction should be such as to avoid blowing the leather out into the ports.

The Technical Institutions.

influenced warship designs in their defensive features. Soft iron armour, such as has not been used for twenty years, had to give place to steel and steel-faced iron. Then came the Harvey system of making armour, the Krupp modification of the Harvey system following in its wake. Krupp steel has, of course, since become practically universal for all thick armoured plates. Sir William pointed out that these successive improvements in armour had been of the greatest assistance to warship designers, enabling them to greatly extend the armoured areas by reducing the thickness of armour, while maintaining equal or securing better protection than was possible with the less resistant armour formerly available.

of 1860 was introduced, the total output of armour in England was about 8,000 tons a year, and considerable difficulty had to be faced in connection with the supply. At the present time in Great Britain, instead of two armour plate factories with an annual output of about 8,000 tons, there were five such factories with a possible annual output of at least 40,000 tons, each of them equipped with the most expensive plant and representing a very large capital outlay. All this had been done by private enterprise, and when criticisms

desirable, said Sir William White, to bear in mind the very large capital expenditure which had been incurred, as well as the unavoidable fluctuations in the value of the orders received by individual firms and the special nature of much of the machinery and equipment which had to be provided. The reconstruction of plant which from

improvements in modes of manufacture was also large and recurrent. In this department, as in many others, the indebtedness of the navy and the nation to private enterprise deserved full acknowledgment. British naval

In an original communication to the Institute of Electrical Engineers, Dr. W. E. Sumpner deals with new iron core instruments for alternate current work-

permanent magnet moving coil type, remarkably little attention has been given to the possibility of constructing instruments on similar lines for alternate-current working. However, Dr. Sumpner said that he was convinced that the difficulties could all be overcome by the application of a few principals and close

briefly stated, fall naturally into two classes: The induction density in the air-gap of the electromagnet, or the current through the moving coil, may not be of correct magnitude owing to the direct or indirect effects of eddy currents, or to variations in the permeability of the iron. The gap flux density and the moving-coil current may not be in proper phase relation, owing to the phase error introduced by the hysteresis in the iron, or by the influence of varying frequency and wave form on the reactance of the instrument circuits.

In summarising the results of his experiments, Dr. Sumpner points out that in general behaviour and characteristics the instruments made are very like permanent moving coil instruments for direct-current circuits. The purpose of the investigation has been to examine for sources of error, and to find out the conditions under which they can be reduced to a minimum. The result is to show that so far as ammeters and voltmeters are concerned, the errors can be made so small that the error in scale reading is too minute to be detected on a scale of ordinary length, and that the error of wattmeters can with good design be made sufficiently small to be negligible for practical purposes under ordinary conditions. What error there is, too, is of an exact and certain kind, and its amount can be predetermined with accuracy with the aid of a few simple tests on the instrument circuits. The main fact which stands out is that the great advantages associated with iron-cored magnetic circuits can be secured in alternating-current instruments in conjunction with accuracy.

The following have been admitted to the Institution

Members :—John H. Allen, New York; Henry A. Barker, Fife; Cyril Brackenbury (Transfer), London; John T. Keating, North Celebes; Henry H. Knox,

Henry Edward Allen, London; Charles O. Bannister, London; Robert S. Botsford (Transfer) London; W. Spratt Boyd, London; Hubert Cartwright, Rhodesia; H. Burtin Corbin, London; Robert Cousin, West Africa; W. R. Dowling Transvaal;

New York; H. E. Hooper (Transfer) South Australia; Arthur E. Lewis, Federated Malay States; G. D. Lucas (Transfer), Federated Malay States; A. Livingstone Oke, Redruth; Philip F. Patterson, (Transfer), Rhodesia; A. Scott Reid, London; Ernest H. S. Sampson (Transfer), Egypt; Henry T. Thomas, Truro; William Thornton, West Calder; C. Hamilton Walker, London; Philip B. A. Went (Transfer,

The Imperial College of Technology.

[illegible]

ORGANISATION TO PROCEED WITHOUT DELAY

[illegible]

SUGGESTED ROYAL COMMISSION

[illegible]

CONSTITUTION OF GOVERNING BODY

[illegible]

One each by the Royal Society, the Institution of Civil Engineers, the Institution of Mechanical Engineers, the Institution of Electrical Engineers, the Iron and Steel Institute, the Institution of Naval Architects, the Society of Chemical Industry, the Federated Institution of Mining Engineers, and the Institution of Mining and Metallurgy.

The Governing Body should have the general management, direction and administration of the new institution, which should be established in the first instance as a school of the University of London.

DISPOSAL OF BUILDINGS.

For the purposes of the new institution the Governing Body should have the entire disposal of the accommodation provided by the Royal College of Science, including the buildings in course of construction at South Kensington, the Central Technical College, and all buildings which may be erected on the additional site at South Kensington.

The site and buildings of the Royal College of Science including the buildings in course of construction should either remain the property of His Majesty's Government or be transferred to the Governing Body of the new institution, as His Majesty's Government may determine.

The site and buildings of the Central Technical College should, if and so long as they desire it, remain the property of the City and Guilds of London Institute, who should provide for their maintenance and repair.

SUGGESTED POWERS OF THE GOVERNING BODY.

The Governing Body should be incorporated, and subject to such special provisions as may be made by their instrument of incorporation they should receive and expend fees and other funds which may be assigned to the purposes of the new institution, they should appoint the professors and the other members of the staff, they should determine the departments and subjects of instruction, they should control the arrangement of the courses of instruction, and the award of diplomas, and they should make provision for the protection of students now in the constituent institutions and of the existing diplomas. Further, in each of the departments of the new institution the Governing Body should appoint a Board, not necessarily consisting of members of their own body, and including members of the teaching staff and persons with practical experience of industrial requirements, to give expert advice with regard to such particulars connected with that department as the Governing Body may refer to them.

MATTERS FOR NEGOTIATION

We recommend that it be an instruction to the Governing Body to enter into negotiations with the University of London, with King's College, and pending its actual incorporation with University College, with regard to the co-ordination of the engineering work of these Colleges with that of the new institution. If, for the purpose of carrying out such co-ordination, funds are needed, either for transferring the Engineering Departments of one or both of these Colleges to South Kensington, or for carrying on at these colleges work of an advanced type which would otherwise be done at South Kensington, or in aid of any other arrangement for that purpose to which the Governing Body may agree, we recommend that the Governing Body be authorised to incur such reasonable expenditure, as may in their opinion be necessary. Subject to such arrangements, we recommend that instruction in the higher branches of technology should, as far as possible, be concentrated at South Kensington. In the establishment of new departments we do not think it will be possible at present to go much beyond the various branches of engineering, with mining and metallurgy, though we hope provision may be made later for other subjects. We think the principal technical and engineering societies should be consulted as to the departments most requiring

make provision in each department.

SPECIALISED DEVELOPMENTS OF MECHANICAL AND ELECTRICAL ENGINEERING

A FULLY EQUIPPED CENTRAL SCHOOL OF MINES

PRELIMINARY TRAINING

At first at any rate, we think preliminary training should be given in the new institution. But while, on the one hand, we do not recommend that admission to the higher technical courses should be limited to students who obtain their preliminary training there; on the other hand, we think that, both as regards the general education of the students admitted and the character of the teaching provided, this preliminary branch of the new institution should be organised with the definite intention of preparing thoroughly suitable candidates for admission to the advantages of the higher instruction which it is the principal object of the new institution to afford.

No student should be admitted to any specialised technical department who has not received, either in the new institution itself or elsewhere, an adequate training of a technical and scientific character such as should be common to every branch of engineering. He should have spent two years on a course of instruction in science, such as he could obtain in a well-organised college or technical institution, after having reached the standard of general education usually marked by University matriculation. An examination test should be imposed on all candidates for admission to the higher departments, except in the case of students who show, by some recognised qualification, that they have received the necessary preliminary training, and when there are more candidates for admission to a particular department than can be received, the best should be selected on a competitive basis.

The preliminary training to be given in the new institution should be of the kind which has just been referred to. It should consist of a course of two years' instruction in science, technology and engineering, of such a character as the Governing Body consider the most suitable preparation for the specialised courses, and it should be, in the main, common to all students proceeding to advanced instruction in any department. We have already indicated our opinion that students who have not attained a certain standard of general education are not fitted to obtain the fullest advantage from the specialised instruction of the higher departments. We therefore think that evidence of this should be required before admission to the preliminary department.

With regard to educational arrangements we recommend that, subject to reservations made by any constituent institution or co-operating body which may stipulate for the right to enter students under prescribed conditions, students should enter not for any one of the constituent institutions but for the new institution as a whole, with a view to following out courses to be arranged by the Governing Body.

STAFF.

The professors of the constituent institutions should be regarded as professors of the new institution. There should be a principal officer of the new institution, who should be responsible to the Governing Body for the supervision of education and discipline in all the constituent institutions.

It must, in our opinion, be left to the Governing Body to work out the scheme in detail and to make statutes and regulations for the new institution in general accordance with our proposals.

ACKNOWLEDGMENTS

In conclusion, the report records the Committee's deep indebtedness to Mr. Sykes, the secretary, for the devotion and knowledge which he has brought to bear, and their obligations also to Mr. Douglas, the assistant secretary. It bears the following signatures:—R. B. Haldane, chairman, Francis Mowatt, W. de W. Abney, W. S. Church, A. H. Leech, Philip Magnus, Walter McDermott, F. G. Ogilvie, Reay, Arthur W. Rücker, Sidney Webb, J. Wernher, W. H. White.

Special memoranda as to the government of the new institution are attached by several members. They are referred to in our editorial notes.

Society of Engineers.

Contractors' News.

This list only contains contracts, particulars of which have not been previously published. For particulars of other contracts, see recent issues of "Page's Weekly," and small advertisements, pages 6 and 7.

We shall be pleased to insert under this column, free of charge, particulars of open contracts.

Contracts Open.

Barnes. [illegible] k.w. steam dynamo, together with switchboard [illegible] Feb. [illegible]

Salford. [illegible] tenders for twelve months' supply of various materials, including electrical and mechanical car accessories, wire, oils, lubricants, etc. Chairman .. .. Feb. 12

Kingston-upon-Hull. [illegible] extension to existing multiple switchboard. Town Clerk, Town Hall. [illegible]

London.—Supply of about 275 tons of steel bridge girders and other iron and steel work of British manufacture, to be let in two contracts, for the Great Western Railway Company. Mr. G. K. Mills, secretary, Paddington Station, London Feb. 13

London.—Supply and delivery of cast-iron plates and jaws for Denham-Olphert's sleepers, for the East Indian Railway Company. C. [illegible] E.C. Feb. 14

Handsworth (Staffs).—For heating and ventilating apparatus in connection with the new schools, Canterbury Road, Handsworth, for the Education Committee. Messrs. Wood and Kendrick, of West Bromwich .. .. Feb. 15

Dundee.—Construction of three filter beds and clear water well. The works are to be constructed on the farm of Easterton of Gagie, [illegible] and Fortar Direct Railway, for the Dundee Water Commissioners. Mr. George Baxter, M.Inst.C.E., engineer and manager, 93, Com- [illegible]

Ingatestone. Erection of an engine-house, construction of a small covered service reservoir, and other incidental works in connection with the Ingatestone Waterworks. Mr. J. Dewhurst, engineer, Avenue Chambers, Market [illegible]

West Ham.—The Borough Council invite tenders for (1) one 1,500-2,000 k.w. two-phase turbo-generator; (2) one 500 k.w. motor generator, [illegible] volts direct current to 2,100 volts alternating current, two phase; and (3) switchgear for above .. .. Feb. 16

Wakefield.—The Town Council invite tenders for a water-softening and purification plant .. Feb. 17

Bilston. [illegible] Bilston Education Committee. Messrs. Bailey and McConnall, Architects, Bridge Street, Walsall .. .. .. Feb. 7

Wakefield.—Supply of a water-softening and purification plant. Town Clerk Feb. 17

London.—Supply and erection of three gas engines for the County Council. The Clerk, Spring Gardens.. .. .. Feb. 20

Cwm Dimbath Wales [illegible] the Garw Water Company. -Mr. Togarmah Rees, M.Inst.C.E., Corn Exchange Chambers, Newport, Mon... [illegible]

Cavan (Ireland).—Tenders for a steam traction engine. Specification from the County Surveyor, Atbara, Cavan .. Feb. 24

Sunderland.—Supply of one boiler-feed pump, one wooden cooling tower, one surface condenser with motor-driven pumps, coal bunkers, gantry, and other steel work, for the Corporation. Mr. J. C. F. Snell, M.Inst.C.E., Town Hall, Sunderland Mar. [illegible]

Bilston.—Installation of heating apparatus on low-pressure hot-water system in the new Council schools now in course of erection at Stonefield, Bilston, for the Bilston Education Committee. Messrs. Bailey and McConnall, architects, Bridge-street, Walsall [illegible]

Coming Contracts.

Hanley.—The town Council have approved a proposal fo laying a double line of tramway in Stoke Road joinin up Howard Place and Park Gates loops. Plans showin the proposed extension have been passed.

Exeter.—The City Council have resolved to invite tende for the extension of the tramways to Stone Lane, and th work will be proceeded with forthwith. The surveyo estimated the cost of the permanent way at £4,200; ca shed, £1,800; six cars, £3,300; total, £9,300. Th electrical engineer estimated the cost of the electric equipment of this length would be about £800, and ad [illegible]

Bath

Hull

Birmingham

Liverpool

Dolgelly

Leamington

Leicester

Hereford

Malvern Wells

Clare

Grimsby

Pontypool

Northampton

Chester

Aston

Hull

Margate

Exeter

Monmouth Basilica

Contracts Closed.

Newcastle-on-Tyne

Portsmouth

Rugby.—The British Thomson-Houston Company, Ltd., of Rugby, have received an order from the Admiralty for a large-capacity continuous-current type M.P. motor and electrically operated switch gear to operate a set of hydraulic pumps of the horizontal type capable of supplying a total quantity of 180 gallons of water per minute at [illegible] cumulator. The motor will be compound wound, and is to be started and stopped automatically by the rise and fall of the hydraulic accumulator.

London.—The London County Council have accepted the tender of R. W. Blackwell and Co., amounting to £82,620 (1) for the execution of the roadwork and pavements in connection with the construction of the underground conduit system of electrical traction of the tramway authorised by the County Council from Camberwell Green *via* Denmark Hill, Champion Park, Grove Lane, Dog Kennel Hill, Grove Vale, and Lordship Lane, to the junction of Lordship Lane and Crystal Palace Road; and (2) for the execution of the paving works outside the tramway-tracks in connection with the widening of the thoroughfares comprising the route of the above named tram-

Ilford (Essex).—The Local Government Board have sanctioned the application by the Urban District Council for a loan of £5,000 for purposes of electric lighting.

Manchester.—Masons Gas Power Company, Ltd., of Levenshulme, are erecting the first section of the new gas producer plant at the Grimesthorpe steel works of Messrs. Cammell, Laird and Co., Ltd. When the installation is [illegible] of coal per hour. Messrs. Mason have also secured the order for the extension of the gas producer plant at the Cyclops Works, making a total of 16 repeat orders received from Messrs. Cammell, Laird and Co., Ltd.

London.—The London County Council have accepted the tender of Messrs. Robert W. Blackwell and Co., Ltd., at a price of £82,620, for the construction of tramways from Camberwell Green to Lordship Lane, Dulwich.

Renfrew.—Messrs. Lobnitz and Co., Ltd., Renfrew, Scotland, have received an order for their patent machinery for breaking rock under water without explosives for the [illegible]

London.—The Brush Electrical Engineering Company, Ltd., have received orders from the South Metropolitan Electric Tramways and Lighting Company, Ltd., for 500-k.w. steam Turbo-alternator and condensing plant; from the Cadzow Coal Company, for electrical coal cutter; from Torquay (per National Electric Construction Company), for 16 double-deck car bodies; and from the Diesel Engine Company, for 100-k.w. dynamo.

Leith.—Messrs. Ramage and Ferguson, Ltd., Leith, have contracted to build and engine two first class yachts for American owners from designs by Messrs. Cox and King, London.

Renfrew.—Messrs. Wm. Simons and Co., Ltd., of Renfrew, have received an order from the Calcutta Port Commissioners to supply for the improvement of the river Hoogly, a very large sand suction pump steamer, fitted with four [illegible] tons per hour.

Leyton.—For roof trusses, etc., for power station extension the tender of Goddard, Massey and Warner, at £161, has been accepted by Leyton Council.

Appointments Vacant.

Newcastle.—Professor of electrical engineering for the Armstrong College, Newcastle-on-Tyne. Stipend, £500 per annum and one-third of fees until £750 in all is reached. Secretary, Mr. F. H. Pruen .. .. .. Mar. 1

Nottingham.—Two junior demonstrators and lecturers are required at University College, Nottingham, one for physics and the other for engineering. Registrar .. .. .. Feb. 10

Bradford.—The lectureship in electrical engineering at the City of Bradford Technical College is vacant. Salary £200 per annum. Particulars from Professor G. F. Charnock. Secretary, Mr. T. Garbutt [illegible]

Durham.—A chair of electrical engineering is to be founded at Durham University

Madras.—The Madras Railway Company require for their locomotive workshops in India the services of a millwright foreman (salary Rs. 350–400 per month); an assistant machine shop foreman (Rs. 275–325); and an assistant foundry foreman (Rs. 275–325). Full particulars from the secretary, Madras Railway Company, 1, Broad Street Place, London, E.C. [illegible]

Appointments Filled.

Cirencester.—Mr. W. A. Thain, assistant lecturer and demonstrator in engineering at University College, Cardiff, has been appointed professor of engineering at the Royal College of Agriculture, Cirencester.

Battersea.—Pending the appointment of a successor to Mr. A. G. Cooke, the former head of the electrical engineering section of the Battersea Polytechnic, Mr. Frank Broadbent, M.I.E.E., will conduct the evening classes in electrical engineering for the remainder of the present session.

Birmingham.—Mr. J. P. Kemp, who recently represented Sir A. B. W. Kennedy on the Mersey tunnel contract, has been appointed resident engineer at the Summer Lane station of the Birmingham Corporation.

Athy.—The Urban District Council have appointed Mr James F. Reade, A.M.I.C.E., of Westminster, their engineer to prepare plans, etc., and carry out his scheme for the water supply of the town and suburbs, which was awarded first prize in the competition held some years ago.

New Companies Registered.

[illegible] cumulative preference). Object, to acquire the business lately carried on by the Queen's Engineering Works, Ltd., at Holbeck, Leeds, to adopt an agreement with G. P. Wallis, and to carry on the business of mechanical, sanitary, and general engineers, bridge builders, machine and engineering tool makers, boiler makers, founders, etc. No initial public issue. The first directors are E. Newell, G. P. Wallis, and H. Alexander. Qualification, £250. Remuneration, £50 each per annum. Registered office, Crown Buildings, Station Road, Doncaster, Yorkshire.

Hankon Light and Power Company, Ltd.—Capital, £20,100 in 2,000 ordinary shares of £10 each, and 2,000 deferred shares of 1s. each. To carry on the business of electrical mechanical, and chemical engineers, contractors, electricians, suppliers of electricity, producers and suppliers of light, heat, sound, and power by electricity, galvanism, magnetism, or otherwise, etc. No initial public issue. The first directors (to number not less than three nor more than five) are to be appointed by the signatories. Qualification, £100. Remuneration, £150 per annum, divisible. Registered office, College-hill, E.C.

[illegible] shares. To acquire the business carried on by H. Birkett, S. E. Birkett, and W. Birkett at Lion Brass Works, Carr-street, Cleckheaton, Yorkshire, as Samuel Birkett and Sons, and to carry on the business of brass and iron founders, manufacturers and finishers of brass and iron goods, engineers, smiths, machinists, etc. No initial public issue. The first directors (to number not less than two nor more than five) are H. Birkett, S. E. Birkett, and W. Birkett. Qualification, 100 shares. Remuneration, as fixed by the company.

[illegible] Norsk and W. T. Walton, and to carry on the business of iron and other ore merchants, iron and steel masters, etc. No initial public issue. The first directors (to number not less than three, nor more than five) are to be appointed by the signatories. Qualification, £500. Remuneration, as fixed by the company. Registered office, Baltic Chambers, Surtees Street, West Hartlepool.

Kenyon Stamping Company, Ltd.—Capital, £2,000 in £1 shares. To carry on the business of spinners, stampers, piercers, tool makers, die sinkers, etc. No initial public issue. Registered without articles of association. Registered office, 1, Temple Row West, Birmingham.

Hunslet Electrical Pottery Company, Ltd. (87,353).—Capital, £3,000 in £1 shares. To carry on the business of manufacturers of and dealers in earthenware pottery in connection with electrical fittings of all kinds. No initial public issue. The first directors (to number not less than three nor more than five) are W. A. Ibbitson, J. Hepworth, jun., A. D. Brighouse, and E. D. Ibbitson. Qualification, £100. Remuneration, £15 per annum, divisible. Registered office, Balm Road Mills, Hunslet, Leeds.

Malleable Steel Castings Company (1906), Ltd. Registered, January 25th. Capital, £5,000 in £1 shares. To take over, as a going concern, the business of engineers, iron-founders, and cast metal manufacturers heretofore carried on by the Malleable Steel Castings Company, Ltd., at Pendleton, Lancashire. No initial public issue. The first directors (to number not less than two nor more than five) are E. Y. Walsh, E. Peckham, and Y. Walsh. Qualification, five shares. Remuneration as fixed by the company. Registered office, Brighouse Street, Pendleton, Lancashire.

De Laitte Gas Machine Syndicate, Ltd. Registered January 25th. Capital, £20,000 in £1 shares. To acquire any patents and inventions relating to the production, treatment, storage, application, distribution, and use of air and gas or any apparatus therefor; in particular, to acquire from L. B. de Laitte, of 8, Rue des Acadias, Paris, and 177, Middlesex Street, E.C., the benefit of certain existing inventions relating to improvements in making carburetted air, and in apparatus for the same, and to carry on the business of manufacturers of gas machines and appliances, etc. No initial public issue. The first directors are L. B. de Laitte, A. Shanks, and A. Davidson. Remuneration, £150 each per annum and £50 extra for the chairman. Registered office, 177, Middlesex Street, E.C.

Weekly Synopsis of Company Meetings and Reports.

Share List of Engineering, Electrical, Iron and Steel, and other Companies.

The following is a comprehensive list of Companies in the industries covered by "Page's Weekly," in which shares business is being currently transacted. Additions will be made from time to time as occasion requires. We desire it to be understood that while our Share List will generally be found correct, we do not hold ourselves responsible for any loss or inconvenience that may arise from possible inaccuracies

Stock Exchange Settling Days.—Settling days on the Stock Exchange are as follows :—
Consols March 1st General Settlements Feb 22nd; March 9th, 28th Bank Rate, September 28th, 1905, 4 per cent.

Engineering, Iron, and Steel Companies.

Engineering, Iron and Steel Companies. *-Contd.*

Present Amount Subscribed	Shares	Last Dividend	Name	Paid up	Closing Prices.
11,370	[illegible]	[illegible]	Allsops & Onions Pneumatic Engineering, Ltd.	3	2¾—3
10,000	5	[illegible]	Do. Cum. Pref. 6 per cent. ..	5	[illegible]
2,210,000	1	[illegible]	Armstrong (Sir W. G.), Whitworth, and Co., Ltd.	1	[illegible]
76,070	5	2/	Do. 4% Cum. Pref..	5	[illegible]
1,500,000	100	4	Do. 4% 1st Mort. Dbs. Rd.	100	101—103
[illegible]	10	[illegible]	Austin, S. P. & Son, Ltd. 5% Cum. Pref...	all	[illegible]
[illegible]	100	[illegible]	Do. 4% 1st Mort. Deb...	100	[illegible]
£100,000	100	4¼	Aveling and Porter, Ltd., 4½% Red. Mt. Debs. Red.	100	94—97
530,000	1	1/7	Babcock and Wilcox, Ltd., Ord. ..	1	[illegible]
100,000	1	7½d.	Do. ,, 6% Cum. Pref.	1	[illegible]
[illegible]	[illegible]	[illegible]	Baker (Joseph) and Sons, Ltd., 6% Cum. Pref.	5	[illegible]
250,000	1	6d.	Baldwins, Ltd., 5½% Cum. Pref. ..	1	[illegible]
£[illegible]	Stk	4¼	Do. 1st Mt. 4½% Deb. Stk. Red.	100	101—103
150,000	4¼	[illegible]	Barrow Hæmatite Steel Co., Ld., O	4¼	[illegible]
[illegible]	4¼	[illegible]	Do. do. Cum 2nd. Pref.	4¼	[illegible]
[illegible]	5	2/6	Bayliss, Jones and Bayliss, Ltd., 5% Cum. Pref. Shares	5	[illegible]
£500,000	100	4½	Beardmore (Wm.) & Co., Ltd. 4½ 1st Mt. Deb. Red., Scrip 50 pd		104—106
[illegible]	10	6/	Bell Brothers, Ltd., 6% Cum. Pref.	10	[illegible]
£[illegible]	Stk	4	Do 4% Deb. Stock, Red.	100	99—101
200,000	1	1	Beyer, Peacock and Co., Ltd., Ord.	1	[illegible]
300,000	1	[illegible]	Do. 5½% Cum Pref.	1	[illegible]
£[illegible]	Stk	4½	Do. 4½% Red. Deb. Stock	100	[illegible]
[illegible]	10	2	Blythe Shipbuilding Co., Ltd.	[illegible]	[illegible]
[illegible]	1	[illegible]	Bolckow, Vaughan and Co., Ltd., O. Nos. 1 to [illegible]	1	[illegible]
[illegible]	1	[illegible]	Do. Nos. 1,639,101-2,500,000	1	[illegible]
[illegible]	1	[illegible]	[illegible] Ord. 60,001/110,000	1	4/0—1/6
[illegible]	1	[illegible]	Do. 6% Cum. Pref...	1	8/3—8/9
1,160,000	1	[illegible]	Brown (John) and Co., Lim., Ord., Nos. 1-1,160,000	1	[illegible]
[illegible]	1	[illegible]	Do. Ord., Nos. 1,160,001-1,750,000	1	[illegible]
[illegible]	10	[illegible]	Do. 5% Cum. Pref.	10	11¾—12¼
[illegible]	[illegible]	[illegible]	Cammell, Laird & Co., Ltd., Ord. ..	[illegible]	10—10¼
[illegible]	[illegible]	2/	Do. 5% Cum. Pref. ..	[illegible]	[illegible]
[illegible]	1	—	Cargo Fleet Iron Co., Ltd., Ord. ..	1	[illegible]
[illegible]	[illegible]	[illegible]	Do. 4½% First Mort. Deb...	100	[illegible]
[illegible]	1	[illegible]	Carnforth Hematite Iron ..	10	[illegible]
[illegible]	[illegible]	[illegible]	Chloride Electrical Storage Cum. 6% Pref...	1	[illegible]
[illegible]	1/-	[illegible]	Clarke, Chapman & Co., Ltd 5% 1st. Mort. Deb...	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	Clayton & Shuttleworth, Ltd., Ord.	[illegible]	[illegible]
[illegible]	[illegible]	2/	Do. Cum. Pref.	5	[illegible]
[illegible]	[illegible]	[illegible]	Do. 4½% Red.	100	[illegible]
[illegible]	[illegible]	[illegible]	Consett Iron Co., Ltd., Ord..	7½	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] Cum. Pref.	10	16"—16½
[illegible]	[illegible]	[illegible]	[illegible] Cum. Pref.	10	[illegible]
[illegible]	1	[illegible]	Delta Metal, Ltd. Shares	1	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]
[illegible]	[illegible]	[illegible]	Do. 4% 1st Mort. Perp. Deb. Stk	100	[illegible]
[illegible]	[illegible]	[illegible]	Dunderland Iron Ore Co., Ltd., 6% Cum. Pref. and Participating..	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	Dunlop (James) & Co., Ltd., Ord...	1	[illegible]
[illegible]	1	[illegible]	Do. 6% Cum. Pref.	1	[illegible]
[illegible]	[illegible]	[illegible]	Ebbw Vale Steel, Iron & Coal Co., Ltd.	13	[illegible]
[illegible]	[illegible]	10/-	Do. do. do.	10	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] Steel, Ltd.	[illegible]	[illegible]
5,000	[illegible]	[illegible]	Do. Cum. Pref. 5%	10	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	100	93—95
[illegible]	10	6/-	Fairfield Shipbuilding & Engng. Co., Ltd., 6% Cum. Pref. ..	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	Do. 4½% Mort. Deb. Stk. Red.	100	100—103
126,000	[illegible]	2/4	Fraser & Chalmers, Ltd., Ord	3	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	5%	Galloways, Ltd., 5% Cum. Pref.	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	10	[illegible]
£[illegible]	[illegible]	[illegible]	[illegible]	100	[illegible]

Present Amount Subscribed	Shares	Last Dividend	Name	Paid up.	Closing Prices.
100,000	1	[illegible]	Glover, W. T. & Co., 5% Cum. Pref.	1	13/6—14/6
£100,000	Stk.	[illegible]	Do. 4½% 1st Mort. Deb. ..	100	85—90
16,800	10	[illegible]	Greenwood & Batley, Ltd., Ord. ..	10	[illegible]
9,600	10	7%	Do. 7% Cum. Pref.	10	[illegible]
965,000	1	1/	Guest, Keen & Nettlefolds, Ltd. Ord.	1	[illegible]
344,000	5	2/6	Do. 5% Cum. Pref.	5	[illegible]
£1,850,500	Stk	4%	Do. 4% Irred. Mort. Deb. Stk	100	106—108
13,000	5	2/6	Gwynnes, Ltd., 5% Cum. Pref. ..	5	[illegible]
250,000	1	1/-	Hadfield's Steel F'dry Co., Ld., Ord.	1	[illegible]
20,000	10	4/6	Do. 7% Cum. Pref.	10	[illegible]
30,000	5	3/-	Hall (J. & E.), Ltd. 6% Cum. Pref...	5	[illegible]
47,500	10	7½	Hawthorn, Leslie & Co., Ltd. Ord.	10	[illegible]
28,001	5	7/-	Head, Wrightson & Co., Ltd. ..	5	[illegible]
[illegible]	1	6d.	Hill (Richard) & Co. (1899) Ld., Ord.	1	[illegible]
18,000	5	[illegible]	Do. 6% Cum. Pref.	5	[illegible]
£100,000	Stk	[illegible]	Hollisby Richards & Sons, Ltd., Ord 6% Cum. Pref.	100	100—103
750,000	1	[illegible]	Howard & Bullough, Ltd., Ord. ..	1	[illegible]
25,000	10	6/-	Do. 6% Pref. Non-Cum. ..	10	[illegible]
£250,000	Stk	4	Do. 4% Deb. Stk., Red. after 1905	100	96—99
37,500	10	20	Kynoch, Ltd.	10	[illegible]
49,537	10	[illegible]	Do. Cum. Pref. 5%	10	[illegible]
300,000	1	[illegible]	Lambert Bros., Ltd., Ord.	1	[illegible]
50,000	5	2/9	Do. 5½% Cum. Pref.	5	[illegible]
40,000	3	2/1½	Leeds Forge Co., 7% Cum. Pref. ..	3	[illegible]
200,000	1	7½d.	Lysaght (John), Ltd., 6% Cum. Pf.	1	[illegible]
£300,000	Stk	[illegible]	Do 4½% 1st Mt. Deb. Stk., Red.	100	109—111
40,000	10	5/-	Mather & Platt, Ltd., 5% Cum. Pref	10	[illegible]
210,000	1	8½d.	Measures Bros., Ltd., Ord.	1	[illegible]
75,000	1	6½d.	Do. 5½% Cum. Pref.	1	[illegible]
£75,000	Stk	[illegible]	[illegible] 1st Mt. Deb. Stk., Red.	100	99—102
[illegible]	1	[illegible]	Mellanby & [illegible] Cum. Pref. ..	1	16/0—17/0
21,943	5	2/6	Muntz Metal, Ltd.	5	[illegible]
14,248	[illegible]	[illegible]	[illegible] Pref.	[illegible]	[illegible]
5,000	62½	47/6	Nantyglo and Blaina Iron Works, Ltd., 8% Cum. Pref.	62½	[illegible]
100,000	1	[illegible]	National Gas Engine 5½% Cum. Pref.	1	23/0—23/6
60,000	[illegible]	[illegible]	Normand, [illegible] Ord.	1	9/6—10/0
[illegible]	1	[illegible]	Do. 6% Cum Pref...	1	18/6—19/0
£[illegible]	Stk	[illegible]	Do. 4½% 1st Mort. Deb...	100	74—77
[illegible]	[illegible]	16/-	[illegible] Ord.	10	[illegible]
75,000	[illegible]	[illegible]	Do. 5% Cum. Pref...	10	[illegible]
80,000	[illegible]	[illegible]	North-Eastern Steel Co., Ltd.,	[illegible]	[illegible]
£250,000	Stk	4½%	4½% 1st Mrt. Db Stk., Red.	100	91—9[illegible]
104,810	1	2½%	Palmer's Shipbuilding & Iron Co., Ltd. A...	all	19/0—19/6
[illegible]	1	[illegible]	Do. B...	16/8	15/8—15/9
170,270	1	2½%	Do. 5% Cum. Pref...	all	[illegible]
[illegible]	1	2½	Do. 4% First Mort. Deb...	all	93—95
122,000	[illegible]	1/6	[illegible] Co., Ltd., Ord., "B"	5	[illegible]
50,000	5	[illegible]	Do. 6% Cum. Pref. "A" ..	5	[illegible]
70,000	10	10/-	Pease & Partners, Ltd., Ord.	10	[illegible]
£400,000	Stk	[illegible]	Do. 4% Perp. Deb. Stock ..	100	[illegible]
20,000	5	3/-	Peebles (Bruce) & Co., Ld., 6% Cm. P.	5	[illegible]
65,000	1	[illegible]	Pooley (Henry) & Son., Ltd., Ord ..	1	13/0—14/0
13,000	5	[illegible]	[illegible]	5	[illegible]
280,000	1	[illegible]	Projectile Co. (1902), Ltd., Ord. ..	1	[illegible]
126,938	5	2	Rhymney Iron Co., Ltd.	5	[illegible]
73,062	5	2/-	[illegible] ..	5	[illegible]
£330,000	[illegible]	5%	Do. 5% Mort. Deb., Red. ..	100	100—102
350,000	1	[illegible]	Richardsons, Westgarth & Co., Ltd., Ord. 350 001—700 000 ..	1	[illegible]
£350,000	1	[illegible]	Do. 6% Cum. Pref.	1	[illegible]
£350,000	Stk	[illegible]	Do. 4½% Perp. Deb. Stock ..	100	100—102
35,000	10	[illegible]	Ruston, Proctor & Co., Ltd	10	[illegible]
£250,000	[illegible]	[illegible]	Do. Mort. Debs. 4½% till 1900 then 4%..	100	91—96
275,000	1	6d.	Scott (Walter) Ltd., Ord.	1	[illegible]
300,000	1	[illegible]	Do. 6% Cum. Pref. ..	1	[illegible]
£300,000	Stk	[illegible]	Do. 4% Perp. Deb. Stk.	100	92—95
549,700	[illegible]	[illegible]	[illegible] Ord.	1	30/0—30/6
112,275	[illegible]	[illegible]	Do. Guar. Pref. (5% Min.)..	1	[illegible]
[illegible]	1	[illegible]	Lo. Do. 112,276/250,000..	[illegible]	12/6—13/6
£115,300	100	5%	Shelton Iron, Steel and Coal Co., Ld. 1st Charge 5% Debs.. Red ..	100	85—9[illegible]
£97,000	100	[illegible]	Do. 6% 2nd Mort. Debs., Red.	100	96—100

[illegible] and shares marked * are quoted ex-div. [illegible].

Engineering, Iron and Steel Companies.

Electrical Manufacturing Companies

Electrical Manufacturing Companies

Electric Lighting and Power.

Railway Carriage and Wagon Companies

Prices Current of Coal, Iron, Steel, and Other Metals.

Manufacturers' and Merchants' Quotations.

MARKET REPORT.

Wednesday, February 7th, 1906.

WARRANT Iron has exhibited a spasmodic tendency, and speculation has been reduced to very small proportions, with a predominance of realisations and bear sales. Prices have ranged within comparatively narrow limits, but the course of quotations has been steadily downwards. The highest price recorded during the last few days has been 52s. 6d., and the closing price to-day was 51s. 6d. cash, and 52s. one month. It is difficult to find any other reason for this dulness in the market except the steady increase in the stocks of Middlesborough iron, but as makers as well as consumers are bare of stock, and the reports from all centres indicate a very large consumption, the position cannot be considered as unsound. The news from the United States indicates that business is still expanding, and seems to indicate probable outlet for the increasing stocks of Middlesborough iron.

Copper shows no decided change, and although prices at one time were carried up to £77 15s., there is a net loss on the week, the latest quotations being £77 15s. cash, and £74 10s. at three months. The general condition of the market appears to be fairly healthy, but there is a slackening off in demand, and possibly consumers are hoping that by persisting in this holding-off policy they may obtain further concessions in price. A notable feature in the manufacturing trade is the large orders which have been placed with tube makers.

[illegible] **Tin Market** [illegible] during the week, and prices at one time were subjected to a sharp rise, but a reaction has ensued, and from the highest of £167 5s. there has been a sharp fall to £165 cash and £163 10s. three months. The statistics for January saw an increase in the total supplies available at the moment, but on the other hand a continuous demand from consumers is absorbing dealers' stocks.

Lead [illegible] speculative holders, and at one time the price touched £16 5s., but at this quotation better support was forthcoming, and the price of soft foreign prompt has rallied to £16 10s. **Spelter** has been dull on further sales by dealers, and is lower at £27. There are signs of weakness in steam coals.

IRON, STEEL, PIG-IRON, &c.

SCOTLAND.

Messrs. David Colville and Sons, Ltd., Dalzell Steel and Iron Works, Motherwell, N.B., quote as follows. Prices delivered in Glasgow or equal [illegible]

Steel:	£	s.	d.
DALZELL STEEL — Siemens Steel Plates, Marine Boiler Quality	8	12	[illegible]
" " " Land "	8	12	6
" Steel Bars, Boiler Quality	8	10	0
DALZELL STEEL — Siemens Steel Plates, Ship Quality Plates	7	7	6
" " Bars " " "	8	0	0
" " Angles	7	0	[illegible]

Manufactured Iron:	£	s.	d.
Bars—Dalzell	7	[illegible]	[illegible]
Best	7	[illegible]	[illegible]
" Horseshoe	7	[illegible]	[illegible]
Angle	7	[illegible]	6
Best Angle	7	1[illegible]	[illegible]
Best Best	8	[illegible]	[illegible]
Extra Best	8	1[illegible]	[illegible]

[illegible] terms and extras. Special rates for delivery in England and export. [illegible] to alteration without notice.

Malleable Common Bars:	£	s.	d.	
Dalzell, per ton	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	10	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	

[illegible]

John Spencer (Coatbridge), Ltd., Phœnix Ironworks, Coatbridge, N.B., quote:—

	£	s.	d.
Bars—Phœnix	[illegible]	[illegible]	[illegible]
Best	[illegible]	[illegible]	[illegible]
Best Best	8	5	0
Extra Best	8	15	0
[illegible]	[illegible]	1[illegible]	[illegible]
Extra B.H.S.	8	15	0
[illegible]	[illegible]	[illegible]	[illegible]
Rivet	7	5	0
[illegible]	[illegible]	[illegible]	[illegible]
Angles—Phœnix	[illegible]	5	[illegible]
Best	[illegible]	1[illegible]	[illegible]
[illegible] Best	[illegible]	[illegible]	[illegible]
Gas Tube Hoops—Phœnix Best	7	15	0
[illegible]—Phœnix	[illegible]	[illegible]	[illegible]
Best [illegible]	[illegible]	[illegible]	[illegible]
Best Best [illegible]	[illegible]	[illegible]	[illegible]
Extra Best [illegible]	[illegible]	[illegible]	[illegible]
[illegible] Tube Strips—Phœnix	[illegible]	0	0

[illegible]

Messrs. R. Feldtmann and Co.

NORTH OF ENGLAND

Messrs. W. Whitwell and Co. Ltd.

LANCASHIRE

The Pearson and Knowles Coal and Iron Company Ltd.

WORCESTERSHIRE

Baldwins, Ltd.

STAFFORDSHIRE

Shelton Iron Steel and Coal Company Ltd.

Cordes Dee Works Ltd.

Messrs. Richard Thomas and Co. Ltd.

BELGIUM.

C. L. Faulkner, Suffolk House, Laurence Pountney Hill, London, E.C., quotes :

Steel : £ s. d.

Finished Steel :

Structural Steelwork.

METALS.

Messrs. French and Smith, 147, Leadenhall Street, and 11, Old Hall Street, Liverpool, quote :

TIN.

English Bars, f.o.b., Dis. 1¼% & 1⅛% ... 168 0 0 to 168 10 0

Straits G.M.B., cash, Warehouse, Net 166 0 0 to 166 2 6

COPPER.

YELLOW METAL.

SPELTER.

LEAD.

ANTIMONY.

QUICKSILVER.

COAL.

LEICESTERSHIRE.

The Nailstone Colliery Company, Leicester, quote :

Upper Main Seam : s. d.

DERBYSHIRE.

The Manners Colliery Company, Ltd., of Ilkeston, quote as follows per ton f.o.b. :

Kilburn Coal : s. d.

9 0

5 0

Rutland Coal :

The Clay Cross Company's Collieries, Clay Cross, near Chesterfield, quote :

per ton

Best Main Coal.

Best House Coal.

NOTTINGHAMSHIRE.

The Digby Colliery Company, Ltd., near Nottingham, quote per ton f.o.b. :

Digby Coal :

Gedling Colliery.

11 0

10 6

10 0

CHEMICALS.

Messrs. S. W. Royse and Co., Albert Square, Manchester, quote :

Acetate of Lime 8 per ton

Ammonia Alum, Lead

Ground, in bags 5 17 6 ,,

Ammonia 24 1 per ton

40 0 0

40 0 0

Messrs Henry Bath and Son

Messrs Barrington and Hunt

TIMBER

Messrs Alfred Dibell and

MINERALS.

Messrs S W Royse and Co

Openings for Trade Abroad.

Portugal.

On the 21st May tenders will be opened at the Directorate-General of Public Works, Lisbon, for the construction [illegible] Aveiro, between Torreira and Bestida.

Spain.

Tenders for carrying out improvement works at the port of San Esteban de Pravia, at the estimated cost of about £271,993, will be opened on 6th March at the Directorate-General of Public Works, Madrid.

Brazil.

The municipal Chamber of Floreanopolis, in the State of Santa Catharina, Brazil, recently held a competition for the electric lighting of the town and the construction of an electric tramway. As only one tender [illegible] tenders.

Spanish North Africa.

Tenders will be opened on 24th inst. at the Directorate-General of Public Works, Madrid, for the construction of a breakwater and an iron wharf at Melilla, and for carrying out improvement works in the natural harbour of the Chafarina Islands.

Switzerland.

A concession has been granted to a syndicate headed by M. J. E. Dunand, of Geneva, for the construction of an electric tramway between Versoix and Divonne-les-Bains, *via* Nyon, Prangins and Coppet. The cost of the enterprise is estimated at about £38,000, of which £7,972, is to be expended on rolling stock.

Netherlands Indies.

From a report on the finances of the Netherlands Indies for the year 1905-6, it appears that the Budget [illegible] for extraordinary expenditure for public works, among which the following items may be noted, [illegible] work, £62,500 for the Atchin tramway, £15,166 for electric motive power, laying of transport railway, and setting up a pump station at Sawah Loento, £14,500 [illegible] Macassar and a dock for Sourabaya.

Roumania.

It is reported that the Roumanian Ministry of Public Works will shortly invite tenders for the supply of two large steamers for the Constanza-Alexandria line, and two cargo boats of 6,500 tons for the Donau-Rotterdam line. The Municipality of Giurgevo will require tenders for the installation of an electric lighting system in that town, at the estimated cost of £38,400.

Germany.

The Commercial Intelligence Branch of the Board of Trade have been notified by H.M. Consul at Stettin (Mr. R. Bernal), that tenders are invited by the Harbour Authorities at Swinemünde for the supply of the following during the [illegible] metres of steel wire-rope in various lengths and thicknesses; 8,030 kilos cast-iron machine parts, and 11,170 kilos cast iron fire-bars. The conditions of contract may be seen at the office of the Hafenbau inspection. Tenders are to hold good for four weeks.

Tenders are in demand for the supply and erection of 18 electric cranes at Hamburg. Tenders will be opened on the 16th February, at the offices of the Finance Administration, Hamburg.

Canada.

According to a recent report by the United States Consul, at Chatham, Ontario, the scheme of railway construction in Canada, which will require from three to five years for its completion, is expected to reach a total of 7,344 miles. The mileage and estimated cost of construction are distributed as follows:—Canadian Pacific, 1,844 miles, costing $41,650,000; Canadian Northern, 1,280 miles, costing $29,000,000; Grand Trunk Pacific, 3,720 miles, costing $101,600,000; Grand Trunk, 200 miles, costing $4,000,000; Northern Pacific, 300 miles, costing $9,000,000. The work projected in the above programme, together with that included in the electric railway projects which are expected to be undertaken, will necessitate about 1,000,000 tons of 80 lb. rails in the next four years, and in addition 300,000 to 400,000 tons of iron and steel for car and locomotive building, switches, trestles, and bridges. It is further estimated that in the present year Canadian railways will require over 100,000 tons of bridge material for renewing and strengthening bridges, the Grand Trunk Railway alone needing for this purpose 30,000 tons.

Chili.

The Director of State Telegraphs in Chili is calling for tenders for the supply of 2,250 metric quintals of wire, 27,500 insulators, 20,000 rolls of Morse paper, and other telegraphic materials. The tenders are to be opened on 15th March next.

[illegible] authorised the Municipality of Punta Arenas to contract a loan of [illegible] for the service of the town.

Italy.

The Municipality of Terrasini (Sicily) have decided [illegible] for supplying that town with water.

It is announced that the following electric railways are projected: (1) The Avellino Provincial Council have decided to grant an annual subvention of 500 lire (about £20) per kilometre for the construction of an electric railway between Naples and Altripalda, *via* Santa Maria del Pozzo, Nola, Lanzo, and Avellino. (2) An application has been made by the Lake Maggiore Navigation Company for a concession to construct a [illegible] railway, 10 kilometres long, between Stresa and Mottarone. (3) The Italian Electric Traction Company have asked the support of the Communes interested in the construction of an electric railway between Aosta and Courmayeur. A maximum capital of about £24,000 will be required for this enterprise.

The Commercial Intelligence branch of the Board of Trade learn that the Ministries of Public Works and Finance are now engaged in drawing up the budget of expenditure for the Italian State Railways during the years 1909–1910. It is estimated that during that period it will be necessary to expend about [illegible] on doubling lines, enlarging stations [illegible] construction works. Many of the principal stations will be enlarged or reconstructed, among others those at Milan, Rome, Naples, Bologna, Catania, [illegible] Turin, Verona, and Venice. A further sum [illegible] the existing rolling stock. Moreover, a further expenditure of some £10,000,000 will be entailed [illegible] increase of traffic during that period, bringing the [illegible] and Omnibus Company to substitute electric [illegible]

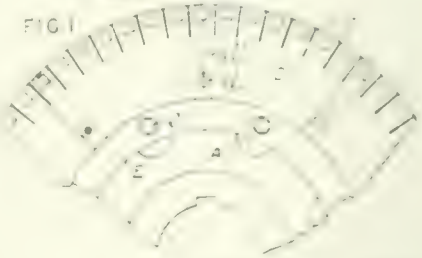
Abridged Specification.

British Thomson Houston Company: London. General Electric Company: Schenectady, New York, U.S.A.

[illegible] by air spaces, the object being to insert a resistance [illegible] temperature of the rings falls owing to the circulation

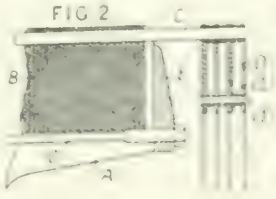
FIG. 3

FIG. 1



of air, and the resistance diminishes. As shown in figs. 1 and 2, the spider A carries the laminations B through which pass the conductors C. The laminations are pressed together by end plates E and bolts *e*. The end rings D are shown connected to the conductors C, and are made of a number of flat plates overlapping to form a number of [illegible]. They [illegible] at in the rings to [illegible] ring D¹ con-

FIG 2



U

the centre of each being bolted or otherwise secured to

New Patents Applied For.

ENGINEERING—CIVIL, MECHANICAL, ETC.

[illegible] London. Improvements in automatic feeding and dividing apparatus for toothed wheel and rack cutting machines and the like. 2,068.

[illegible] apparatus for generating steam or other vapour.

[illegible] tube boiler. 2,144.

Boilers.—G. H. Mann, Leeds. Improvements in steam generators. 1,975.

[illegible] in centrifugal air compressors. 1,843.

Compressors.—J. E. Mathewson, London. Improvements in air compressors. 2,033.

Compressors.—The Platt Iron Works Company, A. J. Pocock, and R. E. Allgire, London. Improvements in air compressors. 1,735.

[illegible] London. Improvements in control apparatus for steam generators. 1,757.

Control Apparatus.—R. Schulz, Liverpool. Improvements in and connected with means for governing steam turbines and the like. 1,772.

Economisers.—H. P. Burgess and H. R. Empson London. Improvements relating to fuel economisers. 1,855.

Elevators—Otis Elevator Company, Ltd., London. Improvements in hydraulic elevators. 1,765.

[illegible] Improvements in starting devices for explosion engines. 2,028.

Fans.—A. J. H. Burn, London. Improvements in enclosed centrifugal fans, or air forcing apparatus.

Feed Water.—R. G. Brooke, London. Improvements in apparatus for treating feed water or other

Furnaces.—J. Munford, London. An automatic shoot for feeding furnaces. 1,831.

Furnaces.—J. Broadwood and Sons, Ltd., and R. H. Collin, London. Improvements in and relating to fuel supply to boiler and other furnaces. 2,042.

Furnaces.—E. Derval, London. Improvements in furnaces for vertical gas retorts and in the retorts employed in such improved or other furnaces. 2,040.

Furnaces.—G. Hales, Hull. Improvements connected with the combustion of fuel in furnaces. 1,973.

Furnaces.—F. Cotton, Liverpool. Improvements in reverberatory furnaces. 1,770.

Furnaces.—J. Ritscher and F. Toth, Liverpool. Improvements in and connected with devices for regulating the air supply to furnaces and the like.

Gas Engines.—C. Griffin, London. Improvements in rotary gas and oil engines. 2,025.

Gas Engines, Starting.—F. H. Ball and F. O. Ball, London. Improvements in starting devices for gas

[illegible] Improvements in and appertaining to reversing gear

Gravity Motor.—T. T. Morris, London. A new or improved gravity or fluid motor. 1,833.

Hoisting Apparatus.—Otis Elevator Company, Ltd., London. Improvements in hoisting apparatus. 1,839.

Hoisting Appliances.—J. R. Temperley, J. Temperley and W. Alexander, London. Improvements in and relating to hoisting appliances. 1,734.

Lubricators.—J. A. Craig, London. Improvements in lubricators. 2,043.

Lubricators—H. H. Lake, London. Improvements in automatic oilers. 1,745.

Lubricators.—H. H. Lake, London. Improvements in automatic oilers. 1,721.

Machine Tools.—The firm of Fullerton, Hodgart, and Barclay, Ltd., and F. P. Strachan, Glasgow. Improvements in and relating to screw driver and chuck devices for lathes, screw machines, drill presses and the like. 1,678.

Metallic Packing.—C. Kenney, Southampton. Improvements in or connected with metallic packing mechanism for piston or other reciprocating or rotating rods, shafts or spindles. 2,096.

Planing Machines.—A. Becker, London. Improvements in planing machines. 1,672.

Presses.—T. R. Bayliss, Birmingham. Improvements in power presses and other like machines. 1,815.

Producer Gas.—G. L. Morton, Gedling. Improvements in and relating to producer gas plants. 1,980.

Pumps.—J. A. Rey and J. M. Rey, London. Improvements in control apparatus for pumps. 1,756.

Pyrometers.—W. Armour Glasgow. Improvements in and relating to pyrometers and apparatus for indicating and recording automatically the progress or course of physical processes or phenomena. 1,906.

Rotary Engines.—R. Mond, London. Improvements in rotary engines. 2,059.

Rotary Motor.—D. Appel, London. Rotary explosive motors. 1,834.

Rotary Motors.—H. H. Lake, London. Improvements in reversing mechanism for rotary motors.

Smoke Prevention.—J. T. Connell, F. Haldane, and J. Thomson, Glasgow. Improvements in and relating to the treatment of smoke and fumes emitted from chimneys, stacks, funnels, and the like, and for preventing the pollution of the atmosphere therefrom. 2,087.

Smoke Prevention. W. Byrom, Manchester. Improvements in or relating to smoke preventing and fuel economising apparatus for steam generators.

Stokers.—C. Erith, London. Improvements in or relating to mechanical stokers for furnaces. 1,656.

Superheaters.—C. C. Wakefield and R. Janson, London. Improvements in or relating to superheaters for steam generators. 1,917.

Transmission.—J. Buckton and Co., Ltd., J. Wicksteed and C. W. James, Leeds. An improved mode of, and apparatus for, changing the speeds and (or) reversing the motion of belt on rope driven mechanism. 1,893.

Transmission.—J. C. Merryweather and G. W. Harris, London. Improvements in appliances for the transmission of power. 1,744.

IRON AND STEEL METALLURGICAL.

...suitable for treating air for use in blast ...

...O. Cowper-Coles, London. Improved ...

...M. Foll.—H. H. Lake, London. Improve... relating to the manufacture of aluminium ...

...—G. H. Rayner and The Hardy Patent ...ny, Ltd., London. A new or improved ... washing coals, cokes, minerals and the ...

...Machinery.—C. W. Ogden, London. Im... ...

Steel.—F. Huntsman and H. F. Huntsman, Sheffield. ...thod of demonstrating or illustrating ...nts for forging, hardening, temper...

...tus for the continuous manufacture of ... slabs and the like. 1,800.

...—T. B. Younger, London. Horizontal ...ater tube condenser for the cooling and ...gas and for the effective removal of tar ...

ELECTRICAL.

...n. Improvements in or connected with ...

...tors.—J. S. Highfield London. Improvements ...ing to systems of laying electric conductors.

...Current.—J. S. Highfield, London. Improve... to high tension direct current electric ...

...A. F. Berry, London. Improve...

...provements in and ...

Surface Contact.—R. Brown ...

...in or relating to mea... electric current to tele...

...ments in and relating t... service. 1,934.

...

SHIPBUILDING.

...werke Act.-Ges. ...rope, or cable, tra... for loading or unloadi...

...ships for diminishing the rolling and pitching motion in a sea-way. 1,643.

...ments in course and bearing ...

...relating to closed stokeholds. 1,831.

...provements ...boats, submarine vessels ...

Motor Boats.—S. E. Saunders, London. Improve... ments in or conne... connections for ...

...ments in and con...

Propellers.—P. ...

MINING.

New Publications.

"MINING LAW OF THE BRITISH EMPIRE."

[illegible] Ahrd, F.G.S., M.I.M.M. Charles Griffin and Co., Ltd. 8s. 6d. net.

At the outset the compiler explains that for the purposes of this volume, the term Mining Law is taken to mean those enactments or established usages which regulate the acquisition and tenure of mining rights and mining ground in contradistinction to mining regulations which control the methods of working a mine. His aim has been not to preclude the work of the solicitor, but to give those engaged in the mining industry a summary of the systems and codes of mining law which obtain throughout the British Empire. Obviously, to those engaged in the direction of exploration and companies seeking fresh fields for exploitation, the book is one of the greatest utility. Having reviewed the general principles of mining law and the divergent systems on which they are founded, the writer discusses the various codes in practice in each of the principal British mining countries. Special attention has been paid to the legislation bearing upon mining leases and properties of such importance as those in which mining joint stock companies are generally interested. In order to facilitate research a list of addresses has been included from which further information can be obtained regarding the mining laws of a number of self-governing colonies.

Books Received.

"Annual Report of the Board of Regents of the Smithsonian Institution [illegible] (Washington: The Government Printing Office.) In addition to the customary reports of the executive committee on the financial affairs of the Institution, and the secretary's account of the year's operations, included in this volume is a "General Appendix," which contains a number of papers of engineering interest, notably, Metals in the Atmosphere, Experiments with the Langley Aerodrome, Electric Welding Development, Progress in Wireless Telegraphy, The Work of the Reclamation Service, and the Projected [illegible] Steel Arch Bridge.

"Surface Contact Traction." By W. Noble Twelvetrees, M.I.Mech.E. A reprint of an article that has already appeared in an engineering journal. The author describes and discusses the merits and demerits of various forms of the surface contact system.

"Electric Power. What it is and What it Can Do." By Alfred W. Marshall, M.I.Mech.E. (Percival Marshall and Co. 3d.) An interesting booklet, explaining in non-technical language the advantages of electricity, and defining every-day electrical terms.

"Practical Pattern Making" and **"Practical Brickwork."** [illegible] (Percival R. Head. 2s. each). The new additions to this firm's Technical Instruction series have been compiled and illustrated in the excellent manner characteristic of Mr. Hasluck's manuals.

"The Practical Electrician's Pocket Book." Edited by H. T. Crew, M.I.Mech.E. (S. Rentell and Co. 1s.) In the new issue of this handy little compendium of electrical engineering, the sections on the Diesel oil engine, conduit wiring, and on accumulators, have been rewritten and brought up to date. Chapters have been added dealing with the comparative cost of electricity and gas, testing with Evershed's Kegger, and the Weston mil-ammeter. Altogether a most useful compilation.

Catalogues, &c.

From the British Advertiser and Business Review [illegible] will calendar for [illegible] year [illegible] showing [illegible] advertising truths as manifested in the olden times.

Herbert Terry and Sons, Redditch.—Some remarkable photographs of screws, illustrating thousands of different patterns, are included in a new illustrated catalogue. The introduction reminds us that the firm can claim fifty years' practical experience as spring experts and specialists. Special processes and plant developed during the period mentioned enable the firm to offer exceptional facilities for making proprietary articles, novelties, patterns for inventors, and component parts for manufacturers, such as springs, clips, wirework, fittings, etc.

Alley and MacLellan, Ltd., Glasgow. — A new catalogue, fully illustrated, is devoted to the firm's "Sentinel" air compressors, which, it is claimed, save largely in power, steam, and oil, and being fully automatic in lubrication and regulation, effect economies in attendance and adjustment. The catalogue describes vertical air compressors, vacuum pumps, horizontal air compressors and sundries. Every effort has apparently been made to give a clear understanding of the various machines, and at the end of the catalogue will be found photographs of the firm's latest works extension, showing the new foundry, which has a floor space of nearly two acres and a maximum capacity of 12,000 tons per annum. The other shops cover about eight acres.

The Vauxhall and West-Hydraulic Engineering Company, Ltd. (Hydraulic and Arsenal Machinery Department).—A very finely illustrated catalogue covering the work of the above department has just been issued, and we gather that it will in future be carried on separate from the marine and motor department, at the West-Hydraulic Works, Luton. The catalogue gives an excellent idea of the extensive hydraulic and arsenal plant, which is included in the company's output. An important section of the work of this department is concerned with hydraulic machinery, designed for special purposes. In the front of the catalogue we have large half-tone views of the works, while at the end are useful tables, showing pressure in [illegible] much

W. F. Dixon and Co., 60, Percival Street, C.-on-M, Manchester. Several circulars received from the above company call attention to a subject of considerable importance in machine driving, viz. improved metal-bushed buffalo raw hide gear pinions and wheels for silent driving. We learn that in the manufacture the triple hydrogen compressed method is employed, extracting all superfluous matter and finishing the block a solid mass of pure hide. Instances are cited in which these pinions have been running 140 hours per week at 800 and 900 revolutions, developing 40 and upwards b.h.p. for more than six years and are still running well and likely to remain in good condition for several more years. Others have been running upwards of seven years on reversing motors in trying situations and exhibit no sign of requiring renewal.

PAGE'S WEEKLY — Miscellaneous

PAGE'S WEEKLY

Engines, &c.

PAGE'S WEEKLY — Miscellaneous

Westinghouse Single-Phase Railway System.

Westinghouse Single-Phase Locomotive, 1,500 h.p.

The Most Complete
Advantages are:-

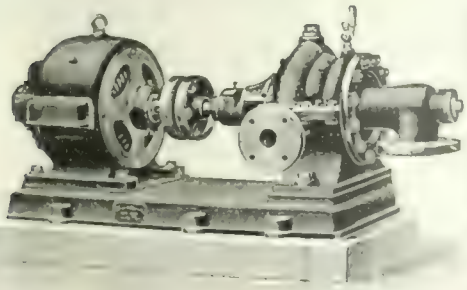
Reduced cost of line construction.
Reduced cost of operation.
Reduced cost of maintenance.
Reduced line loss.
Increased radius of operation from a single station.
Elimination of the rotary converter sub-station.
Elimination of sub-station attendants.
A more substantial line construction.
A
A more economical and effective speed control.
A
reliable and better service.

The British Westinghouse Electric & Manufacturing Co., Ltd.,
LONDON. Branch Offices in all Large Towns. MANCHESTER.

HIGH LIFT
Centrifugal Pumps

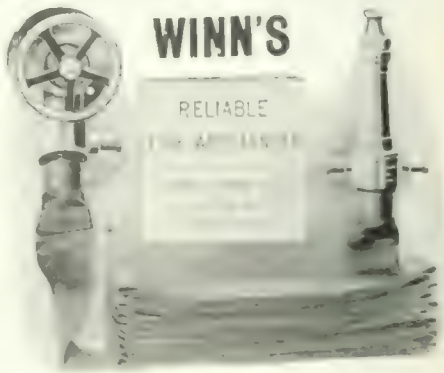
MOST SUITABLE AND MOST ECONOMICAL PUMPS FOR ALL ELECTRICAL AND INDUSTRIAL SERVICES.

OUR SPECIALITY.



Made for any capacity for all lifts, with highest efficiency, especially for direct coupling with Electromotors. The most used Electrical Pioneer Pumps for all services.

WEISE & MONSKI,
HALLE, O.S. (Germany).



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For Rapid and Economical Handling of General Cargo, Coal, Ore, &c.

TEMPERLEY TRANSPORTER CO.,
72 Victoria Street, Westminster,
LONDON, E.C.

PAGE'S WEEKLY — Valves and Boiler Mountings

PAGE'S WEEKLY

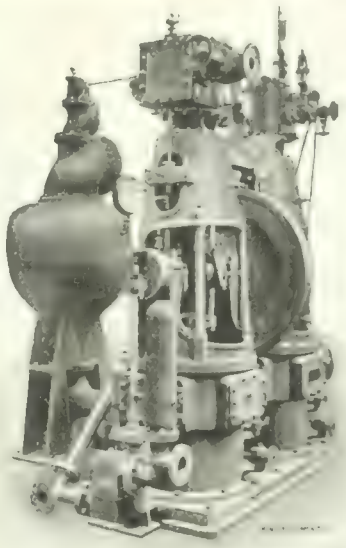
Condensing Plant

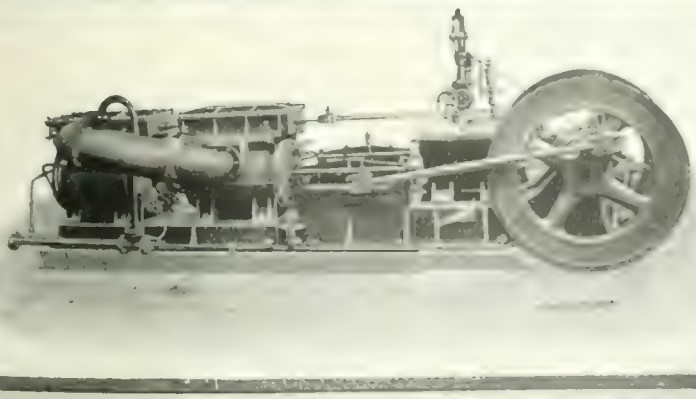
THE MIRRLEES WATSON Co. LTD

GLASGOW.

LONDON OFFICE 148 GRESHAM HOUSE OLD BROAD STREET, EC

CONDENSING PLANT FOR HIGH VACUUM



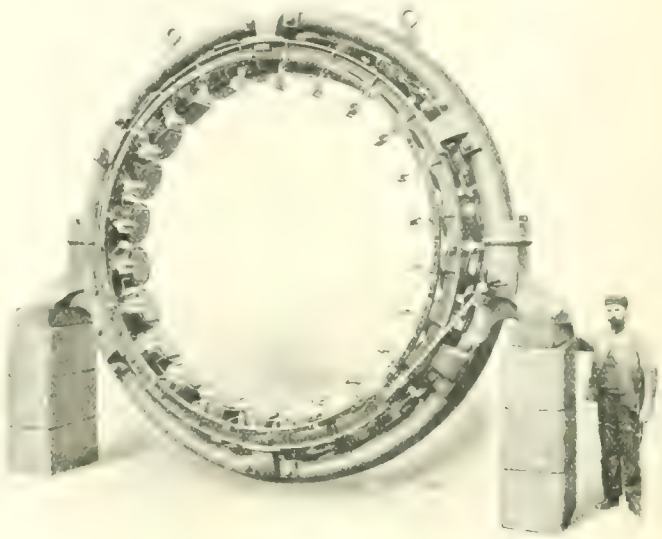


PAGE'S WEEKLY Electrical Apparatus

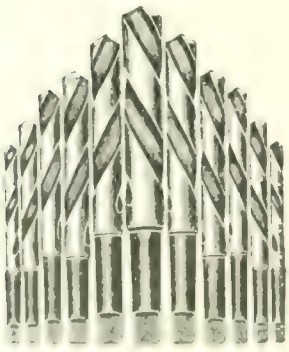
ELECTRICAL MACHINERY

OF ALL DESCRIPTIONS CAN BE OBTAINED FROM

ERNEST SCOTT & MOUNTAIN, LTD., NEWCASTLE-ON-TYNE.



This Illustration shows a Magnet Ring, and Brush Gear of a 600-kw. continuous current Generator.



Twist Drills,
Taps,
Milling Cutters,
Reamers.

H. F. SCHNICKE,
CHEMNITZ (Saxony).

Write for Prices and Particulars
OF OUR
NEW "STANDARD" MACHINES.
They will interest you.

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BEST MATERIAL, WORKMANSHIP, AND DESIGN

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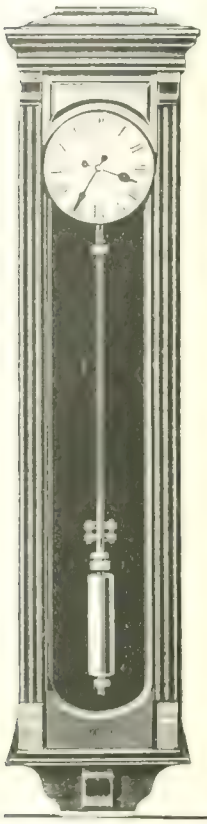
Thornbury Works, BRADFORD.

AKTIENGESELLSCHAFT
Mix & Genest
Telephone and Telegraph Works
BERLIN, W.
INSTRUMENTS OF BEST AND APPROVED CONSTRUCTION.
Illustr. Catalogues supplied to the TRADE only.

Telephone Apparatus
For Internal and Local Lines and Long Distances, with Battery and Magneto Call.
Central and Multiple . . Switchboards.
Electric Bells, Indicators, Fire Alarms, Water Level Indicators.

PAGE'S WEEKLY Electrical Apparatus

PAGE'S WEEKLY — Miscellaneous



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For ACCURATE TIME-KEEPING

In all the various departments of large establishments. Suitable for

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Or any other position.

Perfect and Uniform Time
At all Points.

PATENTEES AND SOLE MAKERS:

GENT & CO., Ltd.

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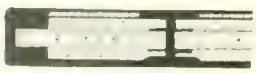
LEICESTER.

And 3a, Upper Thames Street, LONDON, E.C.

NO WINDING UP.

NO ATTENTION NEEDED.

SEND FOR CATALOGUE C.P.



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UNIVERSAL DRAFTING MACHINE.

Piece Work, Balance and Premium Calculator.

Drawing Instruments.

Send for Pamphlets.

JOHN DAVIS & SON

(Derby), LTD.

30, All Saints Works, DERBY, &
36L, Camomile Street, LONDON, E.C.

PLAN-COPYING PAPER & LINEN.

MARION'S world-renowned PLAN COPYING PAPERS and LINENS and LINEN-BACKED PAPERS, giving Blue, Black, and Brown Lines on White Ground, or vice-versa.

THE FINEST ON THE MARKET.

FOR ENGINEERS & ARCHITECTS.

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MARION & CO., LTD.,

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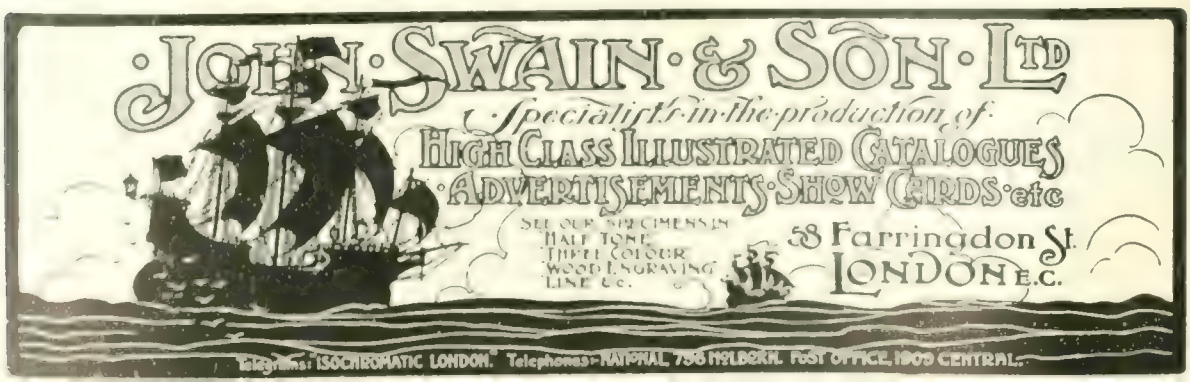

SERVICE FOR ENGINEERS, ETC.

Whether you are selling machinery or service, you can make use of Advertising (in its widest sense) by some means or other.

Judicious Advertising, properly planned and with due consideration to professional etiquette, can be made as profitable to you as to the soapmaker, the merchant, and the proprietor of trade-marked articles.

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During the past year, 51 prominent firms have availed themselves of our services—17 being new to advertising.

We shall be pleased to show you specimens of work successfully done, that have brought profit to our clients.

If our proposals are of interest to you, write for further information to

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PAGE'S WEEKLY

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AND

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FREQUENT and RAPID COMMUNICATION BETWEEN LONDON and PARIS.

SHORTEST SEA PASSAGE

ONLY ABOUT SIXTY MINUTES.

FIVE QUICK SERVICES DAILY, as under:

Via DOVER AND CALAIS.

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[illegible]	[illegible]	[illegible]	[illegible] Victoria Station
[illegible]	[illegible]	[illegible]	[illegible] Charing Cross Station.

Via FOLKESTONE AND BOULOGNE.

Depart from London	Arrive at Paris	Depart from Paris	Arrive in London,
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1 1st and 2nd Class only. † 1st, 2nd, and 3rd Class. * Restaurant Car between Dover and Calais or Boulogne and Calais.

*** First-class Hotel and Restaurant at the Gare du Nord, Paris, and at Calais Maritime Station. Luncheon Baskets obtained at fixed prices.

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South Eastern & Chatham Railway.

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LONDON-PARIS IN LESS THAN SEVEN HOURS.

Five Services Daily in Each Direction.

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Daily Services [illegible] via FOLKESTONE and BOULOGNE

	P.M.		P.M.
CHARING CROSS - - - - - - - - -	2.20	PARIS - - - - - - - - - -	4.0
PARIS - - - - - - - - - - -	9.15	CHARING CROSS - - - - - - - -	10.45

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Four Express Services Daily in Each Direction.

Flushing Royal Mail Route to Germany, etc.

[illegible] Daily in Each Direction.

For Full Particulars see S.E. & C.R. Continental Time Tables, price 3d. VINCENT W. HILL, *General Manager.*

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"An extremely tasteful piece of work, perfectly produced."

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Modern Printing for Modern People.

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WILL ADD TO
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A NEW AND COMPLETE
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Scales, Tapes, Inks, Colours,
Pencils, Cabinets, Papers, etc.

176 PAGES. 300 ILLUSTRATIONS.

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15. Shareholders' Register
16. Filing Catalogues
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PAGE'S WEEKLY

Miscellaneous

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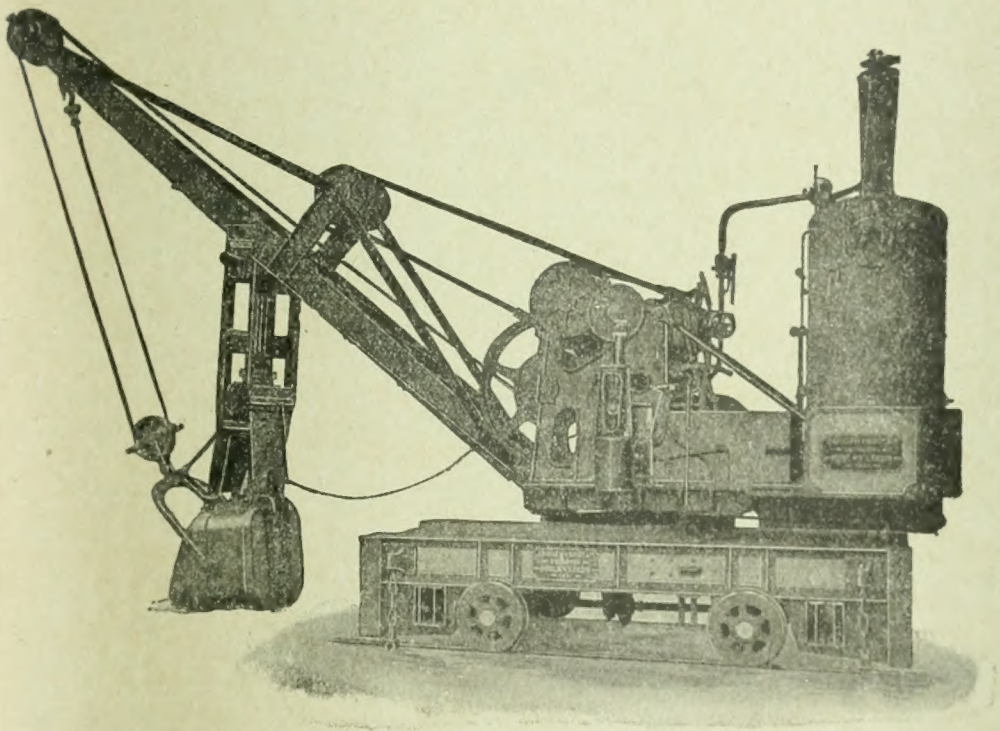
For Cranes and Lifting Machinery, &c.

Telegrams: "Cranes," Nat. Telephone: Leeds District, Stanningley 20.



20 Tons Steam Locomotive Cranes with Excavator.

Locomotive Cranes Overhead Cranes Goliath Cranes Wharf Cranes Derrick Cranes	WORKED BY	Electricity, Steam, Hydraulic Power, Air, or Hand.

Makers to Home, Colonial, and Foreign Governments.

Crown Agents for Colonies and all the Leading Firms in Great Britain.

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